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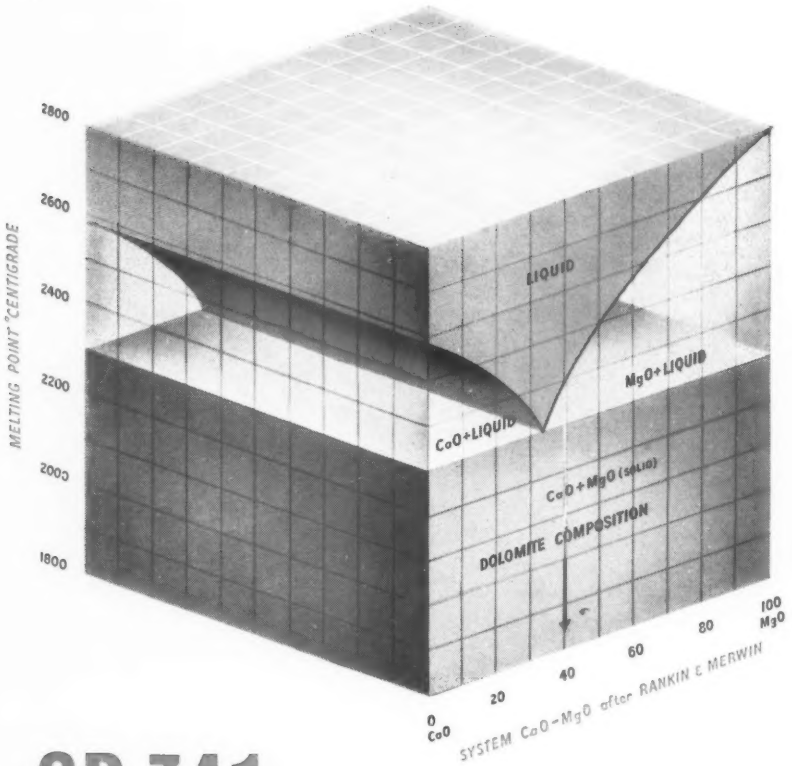

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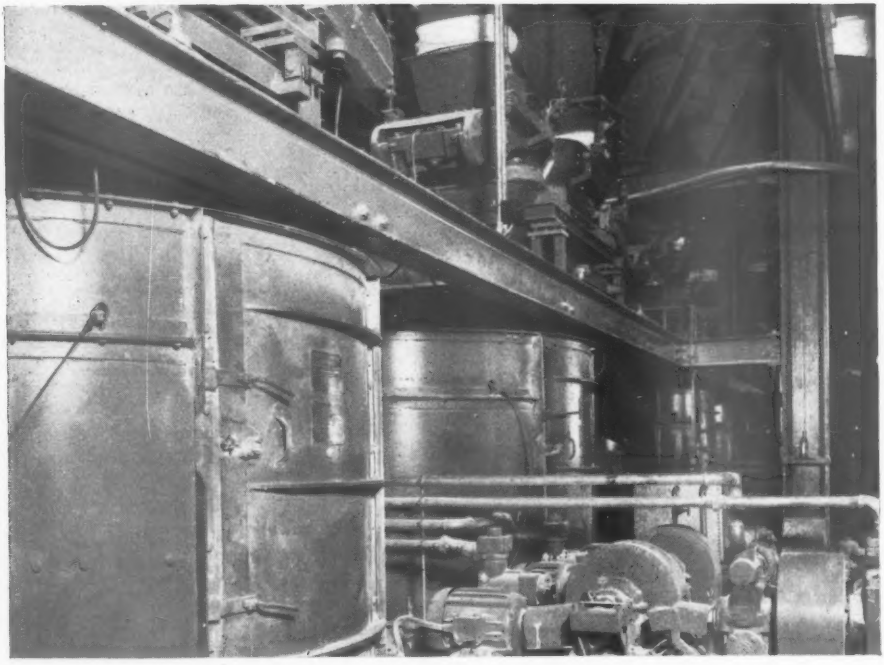

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Suggestion Schemes

A booklet issued by the Industrial Welfare Society carries the title "Successful Suggestion Schemes" and, because of the adjective, it commands attention. The assessment of "success" or otherwise has apparently been made on the number of suggestions per head employed and a case is cited where from 2,900 employees, 4,404 suggestions were received in a given period. The survey covers 208 of the known schemes out of the 500 or more which are estimated to be operating in industry and commerce. The awards paid for successful suggestions ranged from 2s. 6d. to £750. Of the 20 most successful schemes from the "quantity" point of view, only one relates, it would seem, to a foundry concern.

An important part of such schemes is the method by which a suggestion should be made known to the management, and, as an appendix to the booklet, typical forms are printed by which executives' attention may be drawn to an idea. One of these carries a note offering help if needed in filling up the form. Our suggestion is that in every case, a note should be sent to the appropriate official—either the works manager or personnel officer—asking for an interview at which to put forward the suggestion. This being granted, the official himself would fill up the appropriate form, with the applicant just signing it. The official would make no comment, but acknowledge the suggestion and pass it on to the committee for consideration.

A study of the awards given in the 20 most "successful" schemes reveals that the average amounts paid out for suggestions ranged from 18s. to £9. These figures, and those for the maximum and minimum amounts quoted earlier, might worry some firms operating such schemes as to whether or not there is a proper balance. However, the major factor to our mind which applies is the cricket adage—"if you are on a good wicket go on batting." An example of a case where suggestions rarely receive any reward is when a firm operates a successful joint consultation committee and ideas for improvement of employee relations are aired at its meetings. For the majority of firms, reliance is too often placed on the suggestion box. The nature of proposals from employees can often be illuminating for the management and should be encouraged by some expression of appreciation; they indicate that interest is being taken in the conduct of the works. The suggestions which refer to production matters are worth cultivating, as they are a concrete revelation that the man-on-the-floor is cost conscious. Another debatable point is as to whether there should or should not be committees to examine and adjudicate the suggestions. Here we advocate one-man committees with power to co-opt any help needed. For the owner of a small foundry, a periodical question to his men: "Have you got any bright ideas this morning?" will serve quite as well as a suggestion box.

55 Years' Service

To mark the retirement of Mr. C. N. Jennings, superintendent of the foundry and patternshop of Ransomes & Rapier, Limited, Ipswich, a ceremony was held at Waterside Works on December 31, when he received presentations from the works director, Mr. N. F. Dare, Mr. Walter Scott, and from Councillor C. Skinner on behalf of the employees, patternmakers and carpenters, and foundry men respectively.

Mr. Jennings joined the company as an apprentice in 1904, continuing with the company as a patternmaker, and later becoming assistant foreman. In 1931 he was appointed foreman of the patternshop and carpenters; he was made superintendent in 1946.

For many years Mr. Jennings has served on the Council of the Ipswich Engineering Society; he is also a member of the Institute of British Foundrymen, and was president of the East Anglian section for the session 1954-55. A delegate of long-standing to the annual conferences of International Meehanite Corporation, in 1952, he made an extensive tour of the United States on behalf of his firm. In America he visited many jobbing foundries, and collected much useful information on comparative foundry practice in that country and the UK. Amongst the "famous" jobs on which he has been employed at Waterside Works, Mr. Jennings recalls that the first, in 1904, was the revolving stage for the Coliseum, London, which is still in use to-day.

National Society of Master Patternmakers

The National Society of Master Patternmakers announces an alteration in the date of the annual general meeting and dinner/dance. This will now be held at Blackpool over the week-end May 8 to 10, the annual general meeting being held in the afternoon preceding the social function on the Saturday evening. Detailed arrangements will be circularized as soon as they are available. Another item of interest in the programme for 1959, is a visit to the Manchester Ship Canal Docks on February 11, which will consist of a tour of the principal points of interest on the Dock Estate. The Society is actively pursuing the possibility of further trips to the Continent—offering reciprocal arrangements with other patternmaker groups—following successful visits to France and Germany. On April 20, the Society has accepted an invitation to pay an official visit to the Engineering, Marine, Welding and Nuclear Energy Exhibition then running at Olympia, London.

A new member welcomed into the Society is Joshua Shaw & Sons, Limited, Providence Mills, Bradford Road, Batley, Yorkshire.

Latest Foundry Statistics

Light-alloy Castings: Belatedly, the Ministry of Supply has issued the October production figures, when 1,955 tons of aluminium-alloy were produced from sand moulds; 3,762 tons as gravity-die and 1,607 tons as pressure-die-castings. The output of magnesium-alloy castings was 135 tons.

Forthcoming Events

JANUARY 19

Institute of Vitreous Enamellers

Midland section:—"Recent Enamelling Development," by J. Semple, 7.30 p.m., at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham, 2.

JANUARY 20

Institute of British Foundrymen

East Anglian section:—"Properties of Copper-base-alloy Castings," by F. Hudson, F.I.M., 7.30 p.m., in the Lecture Hall, Public Library, Ipswich.

Slough section:—"Tied or Untied—a Paper on Pressure Die-casting for the Commercial Market," by H. R. Abram, 7.30 p.m., in the Lecture Theatre, High Duty Alloys, Limited, Slough.

JANUARY 21

Royal Society of Arts

"Technical Education: A Prognosis," by Lord Nathan, 2.30 p.m., at John Adam Street, Adelphi, London, W.C.2.

Institution of Production Engineers

Peterborough section:—"Some Impressions of Modern Russia," by T. W. Wilcox, 7.30 p.m., at the Conference Room, Peterscourt.

Manchester Metallurgical Society

"The Investigation of Metallurgical Failures in Aircraft," by D. A. Ryder, 6.30 p.m., in the Manchester Room of the Central Library, Manchester.

JANUARY 22

Institute of Metals

Birmingham local section:—"Mechanism of Solidification of Cast Iron," by H. Morrogh, F.I.M., 6.30 p.m., at the Birmingham Exchange and Engineering Centre, Stephenson Place.

JANUARY 23

Institute of British Foundrymen

Birmingham branch:—Annual banquet and dance, at the Botanical Gardens, Edgbaston, at 7 p.m.

JANUARY 24

Institute of British Foundrymen

Northampton and district section:—"Shell Moulding," by D. H. Scott, 7.30 p.m., in the Coffee Room, Plough Hotel, Northampton.

Lancashire branch:—Annual dinner/dance at the Grand Hotel, Aytoun Street, Manchester (details from secretary).

Bristol and West of England branch:—Annual dinner/dance in the Royal Hotel, Bristol, at 6.30 p.m. for 7 p.m.

Honour for the Editor

Mr. V. C. Faulkner, Editor of the FOUNDRY TRADE JOURNAL, has been elected an honorary member of the (French) *Association Technique de Fonderie*, in recognition of the sustained interest and support he has shown in the affairs of the *Association* (Mr. Faulkner has been a member since about 1920), and the important rôle he has played in relation to the International Committee of Foundry Technical Associations since its inception (he presided over the Committee in 1948). Mr. Faulkner is already honorary member of the Institute of British Foundrymen and the German Foundrymen's Technical Association.

THE 63RD ANNUAL MEETING of the American Foundrymen's Society is to be held in Chicago from April 13 to 17. With it will be an exhibition of all types of castings.

Measurement and Control of Moisture Content in Moulding Sand

*By Paul Lippke**

After commencing with a survey of the present position of methods and apparatus for moisture determination in foundry moulding sand, the following account describes the measuring processes and apparatus for ascertaining moisture automatically and for its automatic stabilization at a desired moisture-content value. The necessity for this measurement is explained and the various processes, specially developed by the instrument industry for dealing with these problems, are described, together with the difficulties encountered in applying such measurements.

The necessity of reducing production costs in the foundry industry has led, during the past few years, to at least one notable change, *i.e.*, to the employment of continuously-working, automatic plants for the preparation of moulding sand and its distribution to moulding machines.

This equipment is economic even for medium-size foundries. In many cases, however, uniformity of production and reduction in scrap have not been achieved, because important conditions were not taken into consideration. A most important condition for ensuring high-quality castings production is the automatic stabilization of the moisture-content of the moulding sand used.

One of the foremost specialists in the foundry field is quoted as saying, a short time ago, that a fully-automatic sand-preparation plant without moisture control is like a letter without a stamp; the letter is delivered, but one has always to pay a fine for it!

Moisture Distribution

If one controls the used sand returned to the bunker or coming from a bunker, it is found that often, after even short time-intervals, the moisture content of the used sand may vary by over 100 per cent. This fact can be explained by taking into consideration the fact that it is not possible to avoid dry sand from cast-up moulds (*e.g.*, sand from 1.0 to 1.5 per cent. moisture) being delivered along with sand relatively unchanged during casting and containing perhaps 3.5 to 4.5 per cent. moisture. Sands of such varying moisture reach the storage bunker and later may be charged into the mill. These separate sand masses will enter the mixing process in the reconditioning plant at different temperatures, especially if the sand-usage cycle is too rapid, since quite often the circulating sand has no dwell time at all in the used-sand bunker.

If then, as frequently happens, sand of this type is moistened before or during the mixing time by a fixed water-addition, the following process takes place: wet, cold sand receives the same proportion of water as the dry, hot sand. Until this hot sand is cooled to the average temperature of the total sand mass, it will vaporize a certain proportion of the water added to it. In actual fact, therefore, it should receive a higher proportion of water than the cool sand in order to finish with the same moisture-percentage. Thus, for a constant water-addition at the mill, the sand arriving with a quite high moisture—and which is also cold—will be over-moistened, and the sand arriving dry and warm, will finish up with insufficient moisture.

If these irregularities are to be "ironed out" in the mixer, extra-long mixing times and hence an increased cycle period and extravagant power-consumption is occasioned. On these premises, it is clear that it is insufficient to take a random sample for moisture determination from part of a mixer's charge, of perhaps 10- or 30-cwt. of sand, and from this, to deduce the water addition required for the desired final moisture-content of the whole.

Basic Requirements

In order to obtain an even moisture-content throughout the sand delivered from the mill, it is necessary to carry out a continuous measurement of all the sand supplied to the mill and to add the required water to it on a fluctuating basis. Hence, it is necessary to have, not only a good measuring apparatus for determining the water content continuously, but also a quite elaborate scheme is needed to apply the results of the measuring process so as to make necessary moisture adjustments.

There must also be sufficient sand storage-capacity and adequate plant for mixing the returned used sand on its way to the bunker or in the bunker itself. It is impossible to achieve the absolute moisture-content value of the sand—even with the best measuring apparatus—if the sand passes through the bunker or hopper without having a

* The Author is the proprietor of a firm bearing his name in Germany. His U.K. representative is Foundry Suppliers Limited, 25A Cockspur Street, London, S.W.1.

" dwell " period and if stabilization of the various constituent sand parts cannot take place.

DISCONTINUOUS MOISTURE MEASUREMENT

Calcium Carbide

The process of ascertaining the moisture content of sand by mixing a given weight of it with calcium carbide in a closed vessel, and measuring the resulting acetylene-gas pressure—as a function of the water content—is well known. If one ensures complete union of the water in the sand with the calcium-carbide powder, this method of obtaining the moisture content of a single sample is quite useful. The same procedure can also be used for testing a quantity of heap sand, providing the operator is willing to test not only one but a fair number of samples in rapid succession. The last statement is quite important, since, even with intensive mixing, which is of course not usually found with heap sand, differences in sand moisture of two or three per cent. in layers of sand directly adjacent to each other are no exception, as has been shown earlier. Even with batch-type sand mixers of modern construction, one can, after a short mixing time, always find differences in moisture content between particular sand samples.

The calcium-carbide method has the advantage of being a relatively quick determination. Great care, however, is necessary when weighing the sand sample, so that the moisture is not permitted to vaporize, and weighing needs to be quite accurately and rapidly carried out.

Drying Cabinet

Moisture-content determination by drying the sand until its weight is constant is a more positive method. It does, however, require a fair time for carrying out this procedure, and the method is therefore not suited to a continuously-working plant.

Infra-red Drying

This is a more modern and quicker method of moisture-content determination than that of using the drying cabinet. In this case, too, the moist sand is weighed before, and after, drying by the effect of infra-red rays, and the moisture content can be read direct from a scale which is calibrated to suit a special weighing machine. However, again it is not possible to perform continuous measurement of the moisture content of sand by this method.

CONTINUOUS MEASUREMENT

From the foregoing, it can be seen that a discontinuous measurement of moisture content of moulding sand cannot be successfully operated within the framework of modern sand-preparation plants, and that it is essential to employ a continuously-working rapid-reaction type of measuring instrument. A number of devices entering into this category will next be examined.

Relative Air-moisture Method

This process consists of measuring the relative moisture of air which has been in direct contact with the sand. Electric hygrometers, which should give the moisture content of the sand in this way, have been developed for this purpose in America. The process, however, has to overcome extraordinary difficulties. It is very simple to measure the relative moisture of the air in contact with sand (or other material) when dealing with comparatively slow-running processes and when the air temperature does not vary too much. It is, on the other hand, very difficult when these conditions do not obtain. Because of these difficulties, and owing to the variation of the equilibrium ratio of the absolute moisture for different sands and the relative moisture of the surrounding air—as well as the presence of unavoidable dust, which disturbs the measurement—this measuring process is used only in very prescribed circumstances.

Electrical-conductivity Method

Measuring moisture content by purely electrical methods has already been applied in the past to moulding sands. Here appeared to be a convenient method, consisting of measuring the change in conductivity of the moist sand. The conductivity of a clean natural sand for an electric current varies greatly in relation to its moisture content—alternating current being used exclusively for this purpose in order to avoid electrolysis of the water. This method might be ideal, but for the fact that not only does the water-content change the conductivity, but many other factors simultaneously affect the value obtained. For example, a certain content of electrolyte has to be present in the water in order to make it conduct at all. As soon as this electrolyte content changes, the current passing through the sand is changed, even for the same voltage and with the same moisture content. Furthermore, it is the total water build-up in the sand or in the binder, the amount of binder and, most important, the amount of coal-dust additive, which are of extreme significance to the total conductivity of the sand. Many experiments have been carried out in Europe and the USA to arrive at a useable moisture-content measuring device on the lines of the above, but the difficulties described above have so far proved insurmountable.

Di-electric Measurement

In contrast to the foregoing, the purely di-electric method of measuring the moisture content of a moulding sand has been used with great success in the USA as well as in Europe. It consists of measuring the di-electric constant of the moulding sand. If one fills the space between the plates of an electrical condenser with a non-conductor alternative to air, the capacity for retaining an electric charge at a given voltage is changed by a definite factor for each material. This " constant " for each material is called its di-electric constant.

Pure, dry silica-sand grains (like most insulating materials) have quite a low di-electric " constant," and of all the materials found in admixture with silica grains in a moulding sand, water has by far the greatest effect on the constant, thus the measurement of the di-electric constant as a function of

moisture present, is to-day considered the best method of obtaining the true water-content of many other materials, in addition to foundry sand, and has been used for about 25 years with increasing success.

Pertinent Factors

When measuring the moisture content of moulding sand, it has to be remembered that the sand contains not only material of low di-electric constant, but also other relatively good conductors besides water, such as coal-dust. Furthermore, the electrical conductivity of moulding sand increases with increased moisture content since—as described earlier—conductivity is strongly affected by the addition of water to a substance non-conductive in its dry state. In order to be independent of measuring errors therefore, it is necessary to suppress as much as possible the influence of conductivity of moulding sand on the di-electric measurement. This requires the selection of measuring voltages of suitable potential and currents of suitable frequencies. It is therefore necessary that for each type of sand—and sands are extremely variable—the correct frequency be chosen, *i.e.*, the one which gives the most efficient and unbiased measuring effect. For moulding sands, the best di-electric measuring effect is one which produces least bias of the measured value as a result of variations in sand as it arrives from the quarry—*i.e.*, in its own di-electric constant in the dry state, or through electrolyte content of the water or of other constituents of the sand besides water or, finally, through the type and quantity of coal-dust and binder present.

As in the measurement of electrical conductivity, measurement of the di-electric constant takes place instantaneously. Hence, this measuring process solves the problem of testing the moisture content of every ounce of used sand which may be flowing into the mixer or of reconditioned sand flowing out of the system.

American and German Instruments for Di-electric Control

The development of moisture measurement in moulding sand by di-electric means progressed along different lines in the USA from those in Europe. The result is that American-designed apparatus is preferentially built completely into the sand mixer, and the measurement of moisture takes place during the mixing process. In the European application of the same principles, the measurement takes place at the hopper or elsewhere in the used-sand collection system. In the former case, since the water necessary for increasing the moisture content of used sand up to that of finished sand has to be added during the mixing process, one could have misgivings as to whether, during the final stage of the mixing process—and particularly with short mixing times—the water added could possibly be evenly mixed into the whole mass. Another factor with such apparatus is the unavoidable wear and tear of those parts of the measuring instrument which are immersed in the moving sand-stream, since they are constantly subjected to the eroding effect of the rolling sand in the mixer. One advantage of the method as interpreted in the American fashion, however, lies in that the apparatus is simpler and hence less costly, since many components which are necessary for the European type of apparatus are then not required.

The European version of the apparatus is on the following lines: a measuring capacitor is fitted either above the conveyor bringing the used sand to the mixer, or in the sand weighing hopper above the mixer. In either case, the fitting of the measuring capacitor is so arranged that the average moisture content of the total amount of used sand is determined before it reaches the mixer. The moisture-content value so derived is then relayed to an electronic computing unit, which uses values for the weight of the contents of the mixer, and the differential between the desired moisture-content of the finished sand and the derived average moisture-content of the used sand, to determine the amount of water to be added during the mixing process. This quantity of water is then very accurately and quickly added *via* a nozzle system to the used sand during the first few revolutions of the mixer.

This method is to be preferred on account of the certainty of an intimate water-and-sand mix and hence improve uniformity of the sand. It is necessary, however, to take into account the increased cost represented by the electronic computing unit. The outstanding advantage would appear to be the fitting of a measuring capacitor remote from the mixer. Since measurement takes place mostly without contact, wear and tear of important components of the measuring instruments, and mechanical damage to the apparatus by stones or tramp iron in the sand, is made impossible. Both the American and the German systems give guaranteed values for uniformity of moisture content in the prepared sand of the order of ± 0.3 per cent water, and according to information received by the Author, these guaranteed values have been well substantiated in practice at least at a number of European foundry installations using the German equipment.

Sand Cooling

Even with a measuring and control apparatus closely approaching the ideal, success cannot be achieved unless certain basic conditions as regards keeping a check on the sand temperature, and the mixing of wet and dry portions of sand, are adhered to. With large foundries, the storage of huge quantities of sand involves considerable expenditure. Even if not already desirable purely from space considerations, it is therefore worth seriously considering cooling the sand by artificial means. In Germany, a process has been developed whereby cooling of sand is helped by additional moistening. The heat of vaporization of added water has the effect of intensive cooling of the sand. This, too, is effected without the necessity for using large quantities of air, which would result in the removal of fine sand-particles, the replacement of which is costly.

This cooling process presupposes exact dampening of used sand with a quantity of water proportional to the temperature of the sand. Only when

Moulding Sand Moisture Content

every particle in the sand stream has been cooled with the necessary amount of water—neither more nor less—is the cooling efficient, and only then should an estimation of the average moisture content of the used-sand stream be made.

The development work carried out in Germany has shown that this problem can be controlled, and that plant to cool sand by means of moisture addition is more economical both in cost and space than the use of air-cooling alone, which inevitably entails larger cooling-drum dimensions.

Cooling of the sand is of paramount importance in exact measurement of the final moisture content of the prepared sand in the hopper above the moulding machine. It should need no emphasis that sand heated to well above 100 deg. C. will lose various amounts of water both when wetted (during the mixing process) and also later in transit from the mixer to the moulding-machine hoppers—the actual quantity depending on the time in transit and on air and weather conditions.

Even if a special setting mechanism is provided (as is done in the German version of this type equipment), in order to add water to the mixer corresponding to the predeterminable moisture losses of sand in transit to the moulding machines, it still does not necessarily guarantee uniform sand moisture of all machine stations, since, clearly, no transport system exists which has the same vaporizing factor for unequal spacing between mixing installations and particular moulding machines. This final aspect must always be taken into consideration in setting up the ideal, fully-automatic sand-preparation plant.

Conclusion

Measuring and dosing plants installed up to the present for controlling the moisture content of prepared sand have shown that considerable practical improvements can be achieved compared with earlier systems. Not only can the supply of uniform sand considerably increase the output of a foundry, but it has also been proved that there is then practically no scrap attributable to incorrect moisture content.

Naturally, it is to be expected that the moisture measuring and dosing plants specially developed for the foundry industry will, in the course of time, undergo more technical improvement. Such developments can, however, only be reached as a result of close co-operation between foundry personnel and the manufacturers of measuring and treatment plant.

AT THE JANUARY LUNCHEON MEETING of the Non-Ferrous Club held last week at the Queen's Hotel, Birmingham, Mr. E. Luscott-Evans told his audience that at least £300,000,000 was spent each year in advertising in one form or another. Much of this, he said, was spent by very large organizations who would not countenance such expenditure if it did not yield results. At the luncheon a collection was taken on behalf of the Royal Metal Trades Pension and Benevolent Association, a sum of £15 being realized.

Book Review

Handbook of Lattice Spacings and Structure of Metals and Alloys, by W. B. Pearson, D.F.C., M.A., D.PHIL. Published by Pergamon Press, Limited, Fitzroy Square, London, W.1; price £13 2s. 6d.

The volume under review is volume 4 in the International Series of Monographs on Metal Physics and Physical Metallurgy. This book is divided into two parts. Part I, the shorter of the two, at 75 pages length, provides a general introduction to the application of X-ray techniques to the determination of structure and the lattice spacings of metals and alloys, and the relationship of these to the physical state of metals and alloys. Special reference is made to the determination of equilibrium diagrams in relation to electrical, magnetic and other physical properties. Although brief, this is an excellent survey and it is most valuable to have it available for use in conjunction with the tabular material which appears later.

Part 2, the larger part, running to nearly 1,000 pages, is divided into seven chapters, the first giving crystallographic data for structures allocated a *Strukturbericht* type, and also for a number of more-recently-determined structures. These data are given in accordance with the standard setting in the International Tables for X-ray Crystallography from which they have been taken. Then follow three chapters giving tabulated lattice spacings and data of the elements, intermediate phases in alloy systems, and of borides, carbides, hydrides, nitrides and binary oxides, together with the classification of intermetallic phases according to structure type. Next follow two comprehensive chapters, comprising some 780 pages, giving in alphabetical order details of work which has been carried out on metals, alloys, borides, carbides, hydrides, nitrides and binary oxides. Under each heading, a critical review of the published work is given which enables the reader to appraise the state of knowledge without having to refer to the original literature. Special reference should be made to the excellent, clear diagrams which occur in this section, and others. Many of these diagrams show the relationship of lattice parameters and composition and also, in some cases, temperature. These diagrams are likely to be of great help to workers in this field. There is also a large number of tables giving the relationship of composition and lattice spacing.

Without doubt this work constitutes a standard reference work and is likely to become part of the "equipment" of crystallographical and metallurgical laboratories; the high price of the book is likely to be more than offset by the saving effected in time otherwise required in searching the literature.

A tremendous amount of information in highly condensed form is contained in this work which is recommended wholeheartedly.

J. E. GARSIDE.

House Organ

Follsain-Wycliffe Newsletter, No. 2. Issued by Follsain-Wycliffe Foundries, Limited, Lutterworth.

This is a magazine devoted entirely to the interests of the firm's staff and in it they are told of progress and policy of the company. There is information about a new canteen and social centre and the completion of a new machine-shop, also there is a report that the works are on "full time." To conform to the general run of house organs, the reviewer suggests that the name and address of the works should appear somewhere.

*Craft Apprentices' Corner**

Multiple-part Moulds . . . .

. . . with "Tubal Cain" on the (Three-part) Job!

I had a bit of a shakin' t'other day when a young feller 'bout like yerselves—still learnin'—asked me if I could put 'im right wi' some homework he'd got on multiple-part moulds.

A simple enough question it was, but what shook me was the fact that 'e didn't even know what the term "multiple-part mould" meant—and 'im wi' four years in the foundry! Then I got on to thinkin' that after all we *do* use some uncommon terms in the foundry, and also that these terms differ quite a lot in various parts of the country. Very often too the same term will have a different meaning in different districts, and I'm thinking it wouldn't be a bad idea if at least *some* of these terms could be

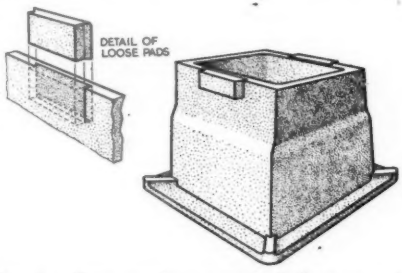


FIG. 1.—*Base casting, a typical three-part job.*

standardized in some way, so that a foundryman from say Tyneside (who knows what *he* means by "hard loom") could talk to a foundryman from say Kent (who knows what *he* means by "fat") and they would *both* understand each other. Ar, when I've got ten minutes to meself I'll make a list of some o' the best I know an' you can 'ave a go at figuring 'em out for yerself.

Foundry terms vary . . .

Anyway, to get back to this young feller and his homework; I set out to explain it to him like this: Two-part moulds are the most common type of mould used in the foundry, but moulds which require more than two parts often have to be used. In many cases this is dictated by the shape and construction of the pattern, in other instances the principle is adopted in order to simplify certain of the moulding operations. It is usual to classify such work according to the number of parts needed to make the complete mould; thus a "three-part mould" is a mould made up of three separate parts with a joint (or parting) between each part: a "four-part mould" consists of four parts with a joint separating each: a "five-part mould" has five parts with a joint separating each, and so on. Collectively, they are "multiple-part moulds." The parts of the mould also have their own names; the top part is called the cope, the bottom part is called the drag, and the other parts are known as "intermediates," "middles," "cheeks," "sides," etc., according to which district or part of the country you come from. Personally, if I'm talking about a three-part job I usually refer to it as "cope, middle and drag," but if a four- or five-part job I usually use the term "intermediate." Takes a bit longer to say it, but after all there ain't no middle with a four-part job there's *two*, and I'm blowed if I can see how you can have *two middles* in *one* job. Anyway, as I've said before, it's necessary to make the mould in three or more parts in order to withdraw the pattern from the sand.

Take a Look at the Pattern

A simple example of a typical three-part job may be the base casting shown in Fig. 1. Take a look at the pattern (a shell pattern it is, by the way) and you'll see that the two top pads are made loose from the body of the pattern, and while you're about it notice particularly which way the taper runs because this, naturally, will decide where you have to make your joints. Setting out to make a job of this description the first thing to look for is a suitable set of boxes. Actually the middle part is the most important of the three; this will need to be "as near as d . . . . . is to swearin', of the same depth as the pattern and have double locating lugs, that is *lugs at each joint face*. The nearer you can get the depth of the middle box to the depth of the pattern the better; with a shallow box you will have to build the joint up, with a deep box you will have to cut the joint down.

. . . bed it in the "drag" . . .

Having found a suitable set of boxes, the first step in the moulding operations is to bed the pattern (flange down) into the drag, striking the first joint at the upper edge of the flange (remember that little talk we had on bedding-in a few weeks ago?),* and follow this by ramming the centre cod—not too hard! A section thro' the job would now look as sketched in Fig. 2 (*a*).

* As before in this series, a popular jargon of the foundry floor has been retained in the article to preserve its freshness. Apologies are made in advance to translators.—EDITOR.

* See JOURNAL, October 23.

Craft Apprentices' Corner

. . . mould the middle and top

Next, position the middle box-part and ram this up with the downgate stick in place, ramming carefully around the loose pieces so as not to dislodge them. Sleek the joint around the top edge of the pattern and remove the down-stick. Temporarily cover the downgate with a metal disc (now see Fig. 2 (*b*).

Continuing operations, position the cope box-part and ram this up with the downgate stick in place, but offset a little (say two or three in.) from the downgate in the middle part. Tube a hole thro' the cope to meet the centre cod (here refer to Fig. 2 (*c*).

. . . lift off the cope and make ready . . .

Lift off the cope, turn it over on to a prepared bed, sleek and finish the mould where necessary, and connect the two downgates by a short runner-bar. Vent all around the outside of the pattern and channel the vents off across the joint. Vent the cod well and channel the vents to the centre to meet the tube hole in the cope. Rap and withdraw the two loose pads; lift the middle part cleanly off the drag (leaving the pattern down), and turn it over on to the cope for sleeking and finishing. Rap and withdraw the pattern, cut the ingates, and insert a few face sprigs in the area of the gates. Close the middle part on to the drag; close on the cope, and make ready for pouring (see sketch, Fig. 2 (*d*), and exploded view 2 (*e*).

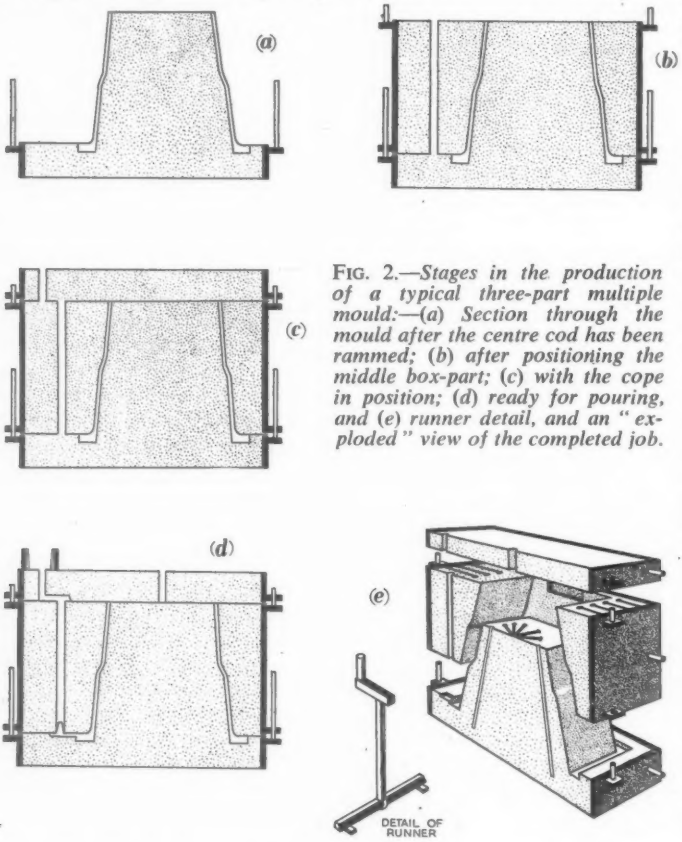


FIG. 2.—*Stages in the production of a typical three-part multiple mould:—(a) Section through the mould after the centre cod has been rammed; (b) after positioning the middle box-part; (c) with the cope in position; (d) ready for pouring, and (e) runner detail, and an "exploded" view of the completed job.*

. . . and the job's done—
***BUT* practice is needed!**

Well now, that's a typical straightforward three-part job, naturally they ain't all quite so simple as this 'un, but whether simple or intricate the basic principles are always the same. Where the skill comes in with intricate jobs is in striking the joints in the right places; ramming and reinforcing the intermediate parts so that they don't drop out, and knowing when and how to remove the loose pieces without "jiggering-up" the mould. It's useful, too, to figure out which cores have to be fastened in *before* closing the intermediate parts together and which cores can be placed *after* closing together. Still, this is a question of experience coming with practice, and you have to start with the simple things first and work your way up to more difficult stuff as progress is made. But remember two things *only* and they'll help an awful lot—first, make certain you *plan your joints according to the taper on the pattern*, and second, *see that your box-parts are right for the job*, especially in depth and location.

GENERAL ELECTRIC COMPANY, LIMITED, announce that an agreement has been reached with Vacuum Industrial Applications, Limited, of Wishaw, Scotland, which will combine the resources of the two companies in the vacuum-heating field, for the development of vacuum-heating techniques, and the design and manufacture of complete vacuum-furnace installations.

THE COATBRIDGE, LANARKSHIRE, FIRM, North British Electric Welding Company, Limited, which started making chains in 1940, is making for official tests a cable chain with a diameter link of 4½ in., claimed to be the largest made in Scotland. Each link in itself weighs two cwt. Recent orders received by the company include two for supertankers, the cable chain of which will be 3⅛-in. dia.

New Zealand Foundry Industry

Dr. W. F. Chubb, who, for a short period, was on the staff of Murex, Limited, has seen more of the world than most metallurgists. He has occupied the Chair of Metallurgy at Cairo University, has been metallurgical director of the Turkish Republic Iron & Steel Works at Karabuk, and is now technical supervisor of A. & G. Price, Limited, Thames, New Zealand. At the annual conference of the Institute of Australian Foundrymen, held in Sydney, Dr. Chubb gave a paper on the subject of the New Zealand foundry industry. The following article is an abstract from the journal *Castings*, which covered the event.

In the Auckland Province, in which indeed approximately two-thirds of the country's industries are located, there are no fewer than 46 foundries, and these vary in size from the largest, with a total of 60 employees, to small establishments with but two or three operators. Only three foundries employ more than 30 men, and the great majority have less than 12 employees.

The three largest foundries are occupied principally with cast-iron production, though all have non-ferrous departments also, while the largest foundry of all, that with which the Author is associated, has a very comprehensive range of interests, including cast irons, s.-g. irons, general non-ferrous work, and a steel foundry producing all qualities of steel, from ordinary mild-steel to stainless-steel castings. The majority of the smaller foundries are interested only in non-ferrous production, brass and gunmetal comprising their main tonnage, and as a general rule they are prepared to undertake any work offered, one foundry specializing almost entirely in art work. Only a limited number of these foundries are equipped for machining operations.

Sand Quality Control

New Zealand foundries, like those of other countries, differ widely in the extent to which the control of sand properties is systematically undertaken. Although all the larger foundries have equipment for the control of sand quality, the majority of the smaller units rely on judgment by sight and feel, and ultimately, upon the skill of the individual moulder. As New Zealand is not well endowed with natural sands of good bonding properties, this means that sands of inferior quality are all too often used in small foundries, to the general detriment of the quality of New Zealand manufactured products. However, many such foundries are now beginning to realize that synthetic sand mixtures offer a much wider range of properties, and are thus of considerable benefit to economy.

As is common experience elsewhere, the greatest benefit from the use of synthetic sand mixtures has been obtained by those foundries engaged in mass-production work. Generally, these larger foundries exercise full control over their founding operations, and employ a responsible person to take charge of sand preparation and testing. Laboratory tests for moisture content, permeability, and compressive strength are the principal controls exercised. The mass-production foundries operate closed sand-systems, the sand being re-circulated at least twice each day, regular additions of bentonite, water and coal dust being made where necessary to keep properties at an optimum level. In some instances, these additions are made automatically.

In a number of the smaller foundries which recognize the advantages of synthetic sands, each moulder is allowed to prepare and maintain his own sand. This practice, however, tends to produce wide variations in sand properties in any one shop, and is not recommended.

Shell Moulding

In New Zealand, as elsewhere, shell moulding has not proved to be the simple solution to the foundryman's major problems, and although shell moulding, using a resin bond, is not, as yet, being used for the production of iron castings, the organization with which the Author is connected is now planning to use this technique for the quantity production of two-stroke crankshafts for lawnmower engines; these to be made in spheroidal-graphite iron. It is hoped to manufacture 30,000 such components in the first year, and double that number during the second year of operation, and experiments to that end are being undertaken. It is hoped that the speed of production, accuracy of dimensions, and excellent surface-finish, which shell moulding should make possible, will enable the standards of quality which characterize the imported product to be equalled.

At the present time, New Zealand has about six shell-moulding machines and all of these are engaged upon non-ferrous work. It would appear, however, that none of these machines is operating to full capacity, this being principally due to the difficulties of securing the appearance and finish which it was hoped would be achieved by the adoption of this technique. It is, in fact, generally true to say that the New Zealand foundryman formerly looked primarily for superlative finish on his castings, rather than for dimensional accuracy.

It is difficult to procure suitable sands for shell-moulds, and although extensive geological surveys have been undertaken, the most promising of the sands so developed have been within the classification of AFS 61 to 84. In consequence, the product has proved in many instances to be little better than that obtainable by casting in green sand.

As to the machines used, these are of the simplest type, with either manual or air-operated dump box

New Zealand Foundry Industry

and gas or electric heating and curing oven; ejection of the "biscuit" being by either manual or air operation. Some difficulty has been experienced in jointing the two biscuit halves in order to eliminate joint-line flash, and the general experience of users is that the manufacturers of shell-moulding machines have been unduly optimistic in their estimates of the production capabilities of their machines, and have shown a strong tendency to over-estimate the hourly rate of production.

Room for Improvement

Although it may be said that experiences in the non-ferrous field have to date not been conspicuously successful, it is the Author's conviction, and a conviction aired by others, too, that ferrous productions should offer much greater scope for this technique. It has to be recognized, by both the customer and the foundryman, that overseas reports extolling the virtues of shell moulding have been founded upon a not inconsiderable research expenditure prior to the establishment of this process on a production basis. Few foundries in New Zealand are equipped for such preliminary experimental work, apart from which most of them are seriously under-capitalized, to such an extent that very careful control over expenditure must be constantly exercised. It may therefore not be inappropriate that one of the first foundries to experiment in this field should be that with which the Author of this paper is associated, for, being the largest foundry in the country, it is able to draw upon the experience of other members of its group of companies. In addition the firm possess the requisite metallurgical and laboratory facilities for engaging in pioneer research for productions on a large scale.

It may also be observed that, as a consequence of import restrictions, there is developing a considerable demand for high-quality specialized castings of a type suitable for production by shell moulding, and it is accordingly evident that with greater attention to sands, shell moulding is likely to play an increasingly important role in ferrous foundry practice in New Zealand, and for that matter, in non-ferrous work also.

Mechanization

Mechanization of foundries has not been carried out to any great extent in New Zealand. One major foundry, which is concerned with the production of lawnmowers, has, however, mechanized the whole of its operations, with the exception of moulding. Two other foundries, both engaged in the ferrous field, are highly mechanized in most departments, but do not appear to have made similar progress in their core-making sections.

In the remaining foundries in the Auckland area, such mechanization as has taken place consists generally of the installation of one or more jolt/squeeze machines for moulding; a mechanical sieve or sand thrower, and perhaps a buggy ladle to carry metal. As to moulding machines, two foundries possess six machines each, three have four machines each, two have either two or three machines, a number of foundries each possess one machine only, while six have no moulding machines of any kind. Among those who have installed moulding machines, it would appear that the roll-over machine is generally favoured for making drags, and the pin-lift machines for making copes.

Developments Imminent

Sand-conditioning plants are coming into use by a number of the larger commercial foundries, and by certain foundries under New Zealand Government control, notably the New Zealand Railways Department. The Author's foundry is now awaiting delivery of a sand-conditioning plant as a prelude to a general re-organization of the whole foundry layout. Of other foundries, 29 employ the rotary-sieve-type of machine, two use pan mills and 12 have Royer machines or screenarators. As to core-sand mixers, 19 foundries have installed such mixers, of one type or another.

Several shops have installed shot-blast cabinets and have made good use of "assembly-line" type of fettling, that is to say, the work being progressively handled from the cleaning to grinding, and tarring where necessary, by some form of mechanical means.

Non-ferrous foundries still rely on tumbling, but there is evidence of an increasing interest in barrel finishing, whereby castings are tumbled in a water barrel with the addition of abrasive material. Wide use is also being made of final finishing with abrasive belts on a backstand idler in both iron and brass foundries. Another operation in which machines are now almost exclusively employed is that of runner and feeder removal, extensive use is being made of bandsaws for aluminium-alloy castings, and of abrasive cut-off wheels for brasses and bronzes.

It may also be said that the smaller foundries are becoming accustomed to semi-skilled and even unskilled labour, and where possible, within the limitations of their capital resources, are very anxious to employ mechanical methods as a means of gaining recruits for their shops. Allied with this is the interest being created by the recently formed New Zealand Institute of Foundrymen, as well as the services rendered to the industry by the Auckland Industrial Development Laboratories of the Department of Scientific and Industrial Research, both of which are encouraging foundrymen to seek better and more efficient methods, and to improve the general working conditions for their personnel.

In the coremaking departments increasing use of coreblowers is in evidence, and there is at least one of the V. and S. core-shooters in operation, whilst the most common is the smaller cartridge type. Core-ovens range from continuous tower ovens to gas- or oil-fired batch-type ovens. As far as is known, only the Author's company is at present engaged in electrification of its core-oven equipment, with recorder-controller facilities.

In conclusion the Author paid tribute to his fellow members of the New Zealand Institute of Foundrymen for their co-operation and help.

Census of Production, 1959

The Census of Production for 1959, to be taken in 1960, will be the first of a series of simple annual censuses for the years between the detailed census for 1958 and the next detailed census. Arrangements for the 1959 census, incorporate two important changes which will simplify the census still further. These changes concern the information required, and the unit to which the returns will relate. The 1959 Census will cover the industries in Orders II-XVIII of the new edition of the Standard Industrial Classification, as in 1958. These are mining and quarrying, manufacturing, construction, and the gas, electricity and water-supply industries. Returns will be required from all firms in this field employing 25 or more persons, with the exception that those contributing to the Board's quarterly inquiries into stocks and capital expenditure will be exempted.

Information Required

The questions asked will be fewer than in any previous census, covering the following three items only: (1) Total value of goods sold and work done; (2) stocks; and (3) capital expenditure. In the capital expenditure section, questions will be asked, for the first time since 1948, about the cost of land and existing buildings acquired, and the proceeds of land and buildings disposed of, in the year, as well as about new building work. It has been decided, after a careful review of the information which will be available from other courses, that particulars of employment, wages and salaries, materials and fuel purchased, work given out, and payments for transport need not be obtained in the census for 1959.

Arrangements are being made for information about salaries, in replacement of that hitherto obtained in the census, to be collected by the Ministry of Labour and National Service.

Coverage of Returns

For 1959 and subsequent years, the statistical unit for which information will be collected in the simple annual censuses will be broader than hitherto. (This change will not apply to the 1958 or later detailed censuses, in which the statistical unit, as in the past, will be the establishment). In the great majority of cases, the return for 1959 will cover the entire business of the undertaking, including any activities which are ancillary to the main business, even when they are carried on by a separate company (*e.g.*, a wholesaling company mainly engaged in selling the products of the undertaking, or a company making containers for packing them).

Where, however, a holding company or group includes units engaged in diverse activities for which separate sets of accounts are kept, separate returns will be required. For units of this kind outside the field of production (*e.g.*, a retail organization), separate returns may be required in the Annual Inquiry into the distributive and service trades. The Board of Trade will be glad to discuss the application of these principles with any firm that wishes to settle the form of their return beforehand. Those who wish to do so, should either write to the Census Office at Lime Grove, Eastcote, Ruislip, Middlesex, or telephone to Pinner 9800, extension 124. Copies of the questions to be included in the census forms are also available from the Census Office.

ECGD Trading Accounts, 1957-58

The yearly trading accounts published by H.M. Stationery Office* show that over the financial year ended March 31, 1958, the Export Credits Guarantee Department increased its credit balance on cumulative account for commercial business from £8,123,135 to £12,991,073. This balance represents the "underwriting reserve" in respect of risks underwritten and outstanding at that date amounting to some £452,000,000. At March 31, 1958, it had been almost restored to the position at the end of the financial year 1951-52 when it stood at £13,000,000—to be reduced one year later to £1,300,000 because of heavy claims in respect of Brazilian transfer delays, and subsequently to a deficit of some £3,500,000.

Premium income for the year was £4,991,001 (compared with £3,689,581 in the previous year). Operating expenses were £1,129,147 (£965,909); claims paid amounted to £4,667,177 (£5,411,245) of which it is estimated that over three quarters will eventually be recovered, and recoveries during the year amounted to £4,824,873 (£5,397,007).

Guarantees given "in the national interest," for the purpose of encouraging trade with countries outside the United Kingdom" amounted to £28,400,000 (compared with £65,200,000); those given "for the purpose of rendering economic assistance to countries outside the United Kingdom" amounted to £6,104,057 (£5,812,447). In the account for "encouraging trade" a surplus over the year of £1,121,677 (compared with £302,544) resulted in a credit balance on cumulative account at March 31, 1958, of £2,291,864, and in the "economic assistance" accounts a trading deficit over the year of £32,276 (compared with a surplus of £23,019) resulted in a credit balance on cumulative account of £216,687.

* Trading Accounts and Balance Sheets, 1957-58, HMSO, Price 7s.

National Lending Library

The new National Lending Library for Science and Technology, the nucleus of which already exists in the Department of Scientific and Industrial Research's lending library unit at Chester Terrace, Regent's Park, London, is to be established by the DSIR in the former Royal Ordnance factory at Thorp Arch, near Boston Spa (Yorks). Present proposals indicate that the library will open at Thorp Arch in 1961 and become fully operational during the following year.

The National Lending Library will cover all subjects in science and technology except for some fields of medicine. It will take over the responsibility for the lending service now provided by the Science Museum Library, which in future will concentrate on serving the needs of the enlarged Imperial College of Science and Technology.

The present unit has been collecting for Thorp Arch since 1957 and it already operates a loan service for Russian works which is being progressively extended to cover publications from other countries. Eventually, much of the scientific and technological literature in the world will be included in the collection. The new library will make its unique collection available to research, industrial, educational, and other organizations by loans and photographic reproduction. Its primary objective will be to encourage the greater use of scientific and technical works and one important activity planned is the expansion of the translating of Russian scientific literature which is now organized by the unit in collaboration with the National Science Foundation in the US.

Equipment and Supplies

Alloy "Stock" for Re-melting

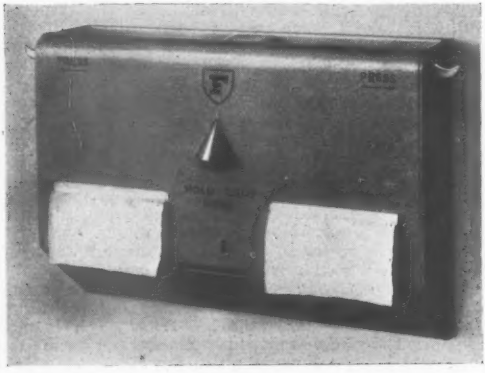
Recently, Sparton Steel & Alloys, Limited, St. Stephens Street, Birmingham 6, investigated what type of alloy-steel stock would be best for remelting in precision founders furnaces. Statically-cast sticks were found not too suitable for the purpose, due to the fact that this type of stock tended to carry slag and oxide inclusions which could not be avoided because of the way the sticks were produced. Next, vertical centrifugal casting was used to produce large-diameter rings for cutting into sections suitable for charging into small furnaces. This no doubt was a much better process, as slag and inclusions were coming to the feeding head which was removed subsequently by grinding. However, the firm were still dissastisfied with the quality of the material as well as the economics of the process.

Finally, the conclusion was reached, after numerous trials, that stock for investment casting could best be produced in the form of bar rolled from steel ingots, properly melted and cast by bottom-pouring methods, and with the use of exothermic heads for feeding and delaying the solidification of the liquid still in the head. This method permits practically all inclusions present to come to the top and during the cogging operation the head is cut off, leaving high-purity material to be converted into bar. To be competitive and, at the same time, to supply good quality re-melting stock, a special rolling technique was developed and the bar is supplied to investment founders in bars having ¼-in. sides.

Commenting on the favourable reception of this type of material by founders, Mr. Z. Stokowiec, B.SC., a director of the firm, submits the following views on release procedure, etc.: (1) Stock for re-melting should be AID released on analysis only; this will cut out expensive 2S.100 AID procedure; (2) the methods used for rolling quickly bring the material to the desired section suitable for charging into small furnaces and the bars are cut into short lengths and de-scaled before despatch, and (3) the bars can be suitably stamped with identification marks, according to customers' own specification. This will ensure that the right material goes into a melt.

Of course, the firm is also in a position to supply rolled bars fully AID released according to 2S.100 procedure—this applies to numerous orders for aircraft construction. Rolled products in addition are despatched in black, de-scaled, centreless-ground or fully-heat-treated conditions.

FIG. 1.—*Lens-cleaning and de-misting cabinet produced by Fleming Safety Equipment, London, E.C.1.*



Lens-cleaning and De-misting Cabinet

One of the chief complaints about industrial eye-protection equipment is that it steams up. Manufacturers are continually seeking to overcome this problem by better design and improved forms of ventilation, but there are circumstances where it cannot be prevented entirely. Fogging, when it does occur, can be dangerous, and always provides an excuse for not wearing eye protection. Furthermore, lenses get dirty and workers rarely think of cleaning them but prefer once again to leave the goggles or spectacles lying on the bench rather than use them.

It is for these reasons that the Fleming lens-cleaning and de-misting cabinet (Fig. 1) has been designed and placed on the market by the safety equipment division of G. & R. Fleming, Limited, 146, Clerkenwell Road, London, E.C.1. The liquid in the cabinet, which is dispensed in a fine spray when the lever on either side of the cabinet is depressed, cleanses as it demists. As a piece of really clean cloth is usually difficult to obtain in the average factory, tissues are also provided in the cabinet, together with space for their disposal after use. Neither liquid nor tissues will damage plastic materials. The company has also placed on the market the lightweight Cettone spectacle No. 3035, and the transparent goggle No. 0080.

Oil Air-content Measurement

F. W. Baggett & Company, Limited, 8, Temple Street, Wolverhampton, are now manufacturing (under licence from the National Research Development Corporation, who hold the patent rights), a device, suitable for works' use, for measuring quickly the air content of a sample of oil. The apparatus consists of a steel cylinder in which there is a cage filled with steel balls. A steel sample-bottle, taking a standard volume of oil, is screwed into the bottom of the cylinder, the sample-bottle being isolated from the main cylinder by a weight-loaded valve. The cylinder is evacuated with a vacuum pump, and then inverted so that the valve opens automatically. The oil sample is thus subjected to a sudden reduction in pressure and spreads as a thin film over the steel balls, their large surface area helping to release all the air very rapidly. The increase in pressure in the chamber, measured with an ordinary vacuum gauge, is then a measure of the air content of the oil.

"Craftsman" Plane

Simmonds Aerocessories, Limited (Surform Division), Treforest, Glamorgan, are introducing a new "Craftsman" plane in response to a demand for a tool combining the Surform cutting principle with the weight and feel of a traditional plane, without sacrificing the speed, efficiency and non-clogging attributes of the blade. For the new tool a high inertia in use, good balance and smooth handling are claimed. Another important feature is the employment of a cast-iron body for the tool, having an accurately machined surface. "Craftsman" models are fitted with the same—replaceable—blade (invented and made by Firth Brown Tools, Limited) as the firm's standard range of Surform tools; it comprises 500 teeth set at an angle in a 10-in. hardened-and-tempered tool-steel blade. Half-round and fine-cut blades, the latter suitable for mild steel and tougher materials, will also fit this model. It is asserted that the tool can be used on a number of materials in addition to wood, including several non-ferrous metals, and it is thought probable that pattern-makers will find the tool specially useful for use on

plastics, where damage to ordinary cutting tools might occur.

Brinell-hardness Indicator

American Steel City Testing Machines, Incorporated, Detroit, have recently developed a new Brinell-hardness tester with a novel paint-spray attachment. The attachment synchronizes with the testing cycle of the machine so that acceptable hardness of castings is automatically indicated by a spot of paint. Sorting of pieces is in effect done by the machine rather than by the operator, resulting in less fatigue and fewer errors.

The new tester is designed to align with any existing roller conveyor. Castings arriving from the foundry are rough-ground top and bottom to remove most of the scale, and then are rolled into place on the conveyor section of the Brinell tester. The operator locates the part by means of a stop (not shown in the illustration) located at the rear of the rollers. He then presses a button at the right-hand side of the load gauge to start the hydraulic cycle of the machine. As the Brinell ball descends toward the casting, the roller section drops down, leaving the casting firmly seated on three hardened anvils, one of which is immediately below the penetrator. The Brinell impression is made and, if the part is acceptable from the standpoint of hardness, a spot of paint is automatically sprayed on to the casting. After a pre-determined interval, the load is released, the ball penetrator retracts and the rollers lift up so that the operator can roll the casting on down the conveyor to the next operation. At the end of the conveyor, castings are sorted. Those not sprayed are sent to the heat-treatment department while those that pass are for machining.

Setting of Brinell limits on the machine is easily arranged in accordance with user's requirements. While the machine shown is a single-purpose unit in that the vertical opening is fixed, other models are made with adjustable openings to handle a variety of work. Spray units can be cycled with "acceptable range" or can indicate "too hard" or "too soft" specimens.

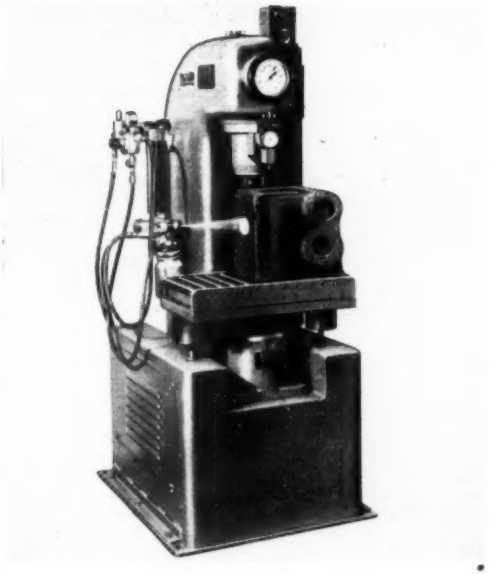


FIG. 2.—*Brinell-hardness tester, with automatic "paint spotting" device to indicate pass or fail.*

HALTRAC, LIMITED, Weimar Street, S.W.15, have recently produced a miniature-pulley hoist made of high-grade aluminium, combining strength and lightness. It has a 72-ft. rot-proof nylon cord and self-lubricating solid-nylon pulley wheels. The unit is rust-proof, and the load is evenly distributed over the seven strands of nylon cord, producing a breaking strength of over 1,200 lb. The multi-locking hooks are designed to act as a self-locking unit, and can only be opened when the weight is released.

TWO NEW STATIONARY HYDROVANE AIR COMPRESSORS have been added to the range manufactured by Alfred Bullows & Sons, Limited, Long Street, Walsall. The first of these, the 200SR9501 has an output of 95 cub. ft. per min. at 100 lb. per sq. in., and is mounted on a 6 by 2 ft. horizontal air-receiver. It is fitted as standard, with a water-cooled oil cooler, and the water flow is controlled thermostatically. The second unit, the 250SR12001, has an output of 120 cub. ft. per min. at 100 lb. per sq. in. This unit can be supplied with an air-cooled oil cooler at an extra cost.

A NEW ROTARY DRESSING-TOOL for cleaning abrasive belts is being marketed by Finishing Aids and Tools, 78 Buckingham Gate, London, S.W.1. It is designed to restore full cutting-power to clogged abrasive belts and is simple in construction, comprising an easily-removed triple-wire rotary-brush, 1-in. wide, mounted in a cast-iron casing. This brush is force-fitted on to a special hardened-steel pin, which fits into steel bearings inside the case. The casing is semi-cylindrical, 2¼ in. wide, and provides adequate protection for the operator's hands, besides reducing the danger from flying particles. One side of the casing is detachable for replacement of brushes when necessary.

BRYANS AEROQUIPMENT, LIMITED, of 15, Willow Lane, Mitcham, Surrey, have produced a portable item of test-equipment, known as the P.V. system test-set, for checking both pressure and vacuum systems at positive and negative pressures within the range of 1 lb. per sq. in. absolute to 115 lb. per sq. in. absolute, *i.e.*, negative pressures 0-30 in. mercury and positive pressures 0-100 lb. per sq. in. A feature of the tester is that gauges under test may be checked without removal from the case, against a standard such as a manometer, gauge or other means of reference. The tester is connected to a standard reference and the pump operated to the required pressure. A comparison is then made between the reference and the test-set gauge. It is claimed that the apparatus is rapid and easy to operate and forms a compact and robust item of test equipment.

VACUUM INDUSTRIAL APPLICATIONS, a subsidiary of R. Y. Pickering & Company, Limited, of Wishaw, Scotland, are manufacturing "watch dog" apparatus for atomic piles in Britain's nuclear-power and research stations. The "watch dogs" are actually ionization chambers, an early form of which was used to locate pockets of radio-active infection following the Windscale disaster. Modified versions have since been installed at Harwell, Dounreay, and other centres, where they are helping to ensure that similar accidents will not occur in future. In addition to their work on ionization chambers, VIA also helped to pioneer the high-vacuum furnace, an advanced method of heating metals to the previously-unobtainable level of 2,400 deg. C., thus obtaining a high degree of metal purity. India has ordered one of these furnaces for use in a reactor which they are building.

Light-castings Industry in Scotland

By Our Scottish Correspondent

During the past year the light castings industry in Scotland had been undergoing a difficult period. The "settling down" of the industry after the post-war boom has taken some time and for both employers and workers it has been rather a painful process. Much reorganization has been taking place and it is hoped that in 1959 the industry will feel the benefit of this.

Trade has not been particularly good and, in fact, the loss of export markets had had serious repercussions. The closure of the New Zealand market has had its effect, and in the markets still left open, increasing competition has had to be met, for instance Czechoslovakia is commencing export of rainwater pipes. On the home market, however, there is hope that the easing of hire-purchase restrictions may bring increased demands for domestic appliances, such as cookers, fireplaces, and baths.

Among foundries closed down during the year was the Castlelaurie Works at Falkirk of Allied Ironfounders, Limited. The close down of the works was due chiefly to the collapse of the export market, especially the North American trade. As recently reported in the JOURNAL, the company has decided to concentrate production of fitted goods in three works at Falkirk instead of four as at present, this being effected by the amalgamation of Dobbie, Forbes & Company, Limited, and Callendar Abbots Foundry Company, Limited. The change will not affect total output of production outside the area but has been made to increase efficiency and reduce costs.

Further Reorganization

Although business is far from good at the present time, the Carron Company are confident that the Low Works reconstruction at Falkirk will result in full-capacity working and further expansion. For many years the company have operated two light castings foundries and with the introduction of mechanization since the war, their five mechanized plants have achieved a capacity greater than was available up to 1939; but with the slackening of trade there has hardly been sufficient work to keep both the foundries fully occupied. The management has now decided to concentrate light-castings production in the Mungal foundry. A new coreshop fitted with the latest equipment has gone into production and further development is planned. The Carron Company, with the close down of their Glasgow works during the year, opened a new press and fabricating department, the work previously carried out at Glasgow being transferred to the new premises at Falkirk.

The reason for the Glasgow close-down was the increasing demand for sheet-metal products and the extensions in the range of steel fabrications. This type of work called for heavier machinery which could not be accommodated at the Glasgow premises. The new Falkirk factory will be able to undertake all classes of sheet-metal and stainless-steel fabrications for kitchens and other domestic services. It is worthy of note that this year the Carron Company celebrates its 200th birthday.

From such reorganization and new developments it is apparent that the industry is making determined efforts to meet the challenge of the times, dismal though the overall general picture may be at present.

United Steel Dividend raised

Works of the United Steel Companies, Limited, generally operated at a high level of capacity during the first half of the financial year ended September 30, 1958. Both production and earnings, state the directors in their annual report, were higher than for the previous period. The general reduction in demand towards the end of the year, however, made it necessary to slow down production and earnings were correspondingly lower in that period.

Gross income in 1957-58 of £122,050,000, compared with £117,790,000. The balance available for parent company's appropriation of £7,319,000 compares with £4,715,000, and the dividend is raised from 11½ per cent. to 12½ per cent.

Capital expenditure for the year amounted to £13,978,000 and outstanding commitments last September totalled £7,387,000 (£9,600,000). Fixed assets expanded from £72,400,000 to £82,200,000. Net current assets are little altered at £23,700,000 (£23,800,000).

The outputs of the company's principal basic products for 1958 (1957 figures in parentheses) are as follow:—Steel ingots, 2,708,000 (2,855,000) tons; pig-iron, 1,690,000 (1,748,000) tons; coke, 1,528,000 (1,592,000) tons; iron ore, 4,718,000 (4,868,000) tons.

Iron-ore Imports

Iron-ore imports in November, and the totals for the first 11 months of last year and 1957, are shown below.

From	Month ended Nov. 30, 1958.	Eleven months ended November 30.	
		1957.	1958.
	Tons.	Tons.	Tons.
Sierra Leone	48,275	701,087	658,763
Canada	159,664	2,980,392	2,120,800
Other Commonwealth countries and Eire	—	15,024	2,405
Sweden	186,003	3,920,063	2,863,231
Norway	32,470	216,006	263,302
Western Germany	—	2,614	5,115
France	26,358	578,664	445,988
Portugal	7,730	129,761	121,871
Spain	45,226	972,926	562,401
Algeria	127,677	1,377,049	1,318,080
French West Africa	15,270	554,384	322,072
Tunisia	51,302	667,363	525,377
Northern Morocco	—	213,033	120,009
Southern Morocco	28,025	366,169	329,741
Liberia	41,520	317,245	254,129
Venezuela	113,037	1,063,063	1,313,335
Brazil	34,328	634,145	520,083
Other foreign countries	1,210	85,366	187,721
TOTAL	918,095	14,794,354	11,934,423

Brook Motors reports Satisfactory Progress

Gradual improvement in trading conditions in the first three months of the current financial year is reported by Mr. F. V. Brook, chairman of Brook Motors, Limited, Huddersfield. He expects continued expansion from all subsidiary companies and states that the order-book is satisfactory.

Sales in the United States have expanded and there are signs of a trade revival there. The need for sub-component parts is to be met by erecting an additional building at the new fractional horsepower motor factory. Year-end capital commitments in respect of the parent company totalled £163,020 (£145,046).

Notes from the Branches

Lancashire

Mr. H. Paton Millar was the lecturer at the December meeting of the Lancashire branch of the Institute of British Foundrymen, held at the Midland Hotel, Manchester. To illustrate his paper on the "Production of Medium-size Ingot Moulds," he used both diagrams and an excellent series of coloured slides. Following Mr. Paton Millar's able exposition on the subject the meeting was open for discussion during which the following points were raised.

The first questioner was Mr. J. L. YOUNGER who asked Mr. Millar for details of the jolt-ramming of moulds and cores and the possibility of breaking down the loam from the barrel core which been mentioned.

Mr. MILLAR replied that the loam was some ¼-in. thick on the core barrel and it was his experience that the effect of jolting did not disturb this loam coating.

Mr. YOUNGER then remarked on the deepness of the moulds which were jolt-rammed, and asked if any variation in ramming density was experienced.

The AUTHOR replied that ramming density did not vary appreciably; experience in fact dictated that variation should be avoided. Experience also indicated the amount of sand one should feed into the mould or the corebox before jolting commenced. Occasionally some hand ramming was necessary, particularly at the tops of cores.

Mr. LOWSON remarked on the method illustrated for ramming moulds and cores separately, from solid patterns in which complicated means of "location" were used. Could not the mould and core have been rammed together using a hollow pattern, he asked. He said he would also like to know Mr. Millar's views on the occurrence of wafer scabs on ingot moulds.

Mr. MILLAR said that his company had been influenced in their choice of method of making ingot-moulds by the experience gained in the manufacture of vertically-cast pressure pipes, and in this tradition they had developed the methods outlined in his lecture. He could not agree that the means of "location" were complicated, it had always been thought that the means of location illustrated were simple and as foolproof as possible. He agreed that if an impeller-type machine had been used for ramming, then a hollow or "composite" pattern might be an advantage, particularly when making ingot-moulds of over 10-tons in weight. He had experimented with "composite" patterns, and although finding them perfectly satisfactory, could find no advantage over the established method. In this connection, Mr. Millar stressed that the tradition behind the development of any method was to some extent always the deciding factor in the method finally employed. As to the possibility of wafer scabs or "corner shelling," the author referred to his illustration showing the corner venting tubes and described how the effect of such venting on cores was the important factor in reducing and, in fact, eliminating the "corner shelling" defect. The tubes referred to were in themselves very well vented.

Important Provisions

The importance of the technique used in ingot-mould production was then referred to by Mr. E. LONGDEN. There was, he said, sand control to be considered, the possibility of flaking of blacking, necessity for gas exits, etc. He went on to say that when the corebox had been withdrawn further handling of the core should be avoided as far as possible, the core should be dried slowly and over-drying was most undesirable. As to whether ramming of moulds should be done by jolting, impeller or by hand, his opinion was that jolting was the best machine. He had heard of ingot-moulds being made in Belgium, of up to 20 tons in weight, which had been top and bottom run, with identical results; cement moulds were used by some founders. He then said that he had noted that special provisions for the feeding of ingot-mould castings had not been mentioned by the author.

Mr. MILLAR agreed that sand control was an important feature of ingot-mould production. His company made a practice of sampling each mould and core for this purpose and a comprehensive record was kept on a card which followed the ingot-mould throughout its entire life. He remarked that, on occasions, individual moulds or cores were sampled to check the effectiveness of mould and core drying. The cores were not in any way specially vented apart from the corner poles referred to previously, and then only in the case of a mould with a corner flute—as the sand itself being of a high permeability was capable of venting itself. It should be stressed that the internal surface of the resultant casting must be as near perfect as possible and any interference with the core surface was to be avoided at all costs. Moulds and cores were dried over a period of several hours—this operation taking place overnight. The result, as would normally be expected, was slow drying at first, building-up to the maximum permissible stove temperature. He agreed that over-drying was most undesirable and could cause considerable trouble. Ingot-moulds should not necessarily require feeding, though he was aware that many ingot-mould manufacturers did embark on heavy feeding. It was a personal opinion that this feeding was much the more necessitated by mould dilation and consequent increase in the volume of the mould cavity on casting than in the liquid shrinkage of the hematite metal used for the casting.

Mr. H. HAYNES asked for details about the location of the downgate; what was its diameter and the ingate area needed to run a casting in 90 sec. he asked.

Mr. MILLAR replied that the downgate pole was located on the jolter table by a pin or dowel and was centred by a corner strap across the top of the moulding box; this pole was withdrawn from the mould before the pattern was removed. The resultant downgate was 2¼-in. dia. at the bottom and 3¼-in. at the top. The ingate cross-section was five sq. in.

Comparative Practices

Mr. LOWSON said he thought the jolting method of producing ingot-mould moulds was the best to use for composite patterns, but for larger mould castings, *e.g.*, those of 60 tons, impeller ramming was a good "second best." Cement moulding of such castings required a completely new layout and depended primarily on an abundant supply of cheap sand. He disagreed with the idea that sulphur content of the metal had no effect on ingot mould-life; he had seen "lugs" pulled out of apparently sound ingot castings. Some feeding might be beneficial to mould life, he thought.

To this Mr. MILLAR replied that both jolting or impeller ramming could give equally good results. It depended to some extent on the methods traditionally used in any one moulding shop. He pointed out, however, that the manufacture of ingot-moulds above 10 tons in weight was a rather cumbersome process *vis-à-vis* jolting and the pattern and moulding-box equipment, plus the weight of sand, very soon exceeded practicable jolting capacity. He had had no experience of cement/sand moulds and with regard to sulphur content replied that controlled experiments had been carried out by one of the BISRA committees on

Notes from the Branches

this very matter. Over a large number of moulds produced in the author's foundry and also at a large ingot-mould foundry in South Wales, steps had been taken deliberately to increase the sulphur content on the internal surface of mould castings by coating or impregnating the core surface with sulphur-bearing material. Considerable sulphur pick-up was achieved, yet over a large number of moulds, no deterioration in mould life in the steelworks was found. Referring again to feeding, Mr. MILLAR remarked that he did not disagree with the speaker that it might be better to feed certain moulds; all he was trying to stress was that ingot-moulds need not necessarily be fed.

To Mr. F NIELD who asked about ingot-mould life, Mr. MILLAR replied that this depended on many things. First, it was essential that a casting be produced free from defects on the internal surface, and particularly free from such defects as cold laps. It was also necessary that a low-phosphorus, high-carbon type of iron be used (and at this stage it might be added that there appeared to be some application for a spheroidal-graphite iron in this field). Much could also be done in steelworks to ensure that moulds were not mishandled in use, particularly when they were at an elevated temperature. Mould design was also extremely important.

To co-ordinate these many factors which affected the ultimate life of the mould, Mr. Millar described how his company found that a producer/consumer committee consisting of the foundry management on the one hand with the steelworks personnel, metallurgists and design staff on the other, combined to ensure that all possible steps were taken to create the type of ingot-mould which would give the highest possible life.

Mr. LOWSON here supported Mr. Millar's remarks by saying that the company with which he was connected supplied ingot moulds to as many as 30 different works, so they were in a position to compare mould lives. For example, one customer might obtain a life of 200, whilst another had only 50 casts from identical moulds. He thought the pouring/stripping cycle was a very important factor.

Mr. HENDY said he thought that the sand dry-strength reported seemed low, and wanted to know whether other faults besides "crazing" and fracture arose. He also enquired whether different types of iron were being experimented with.

Mr. MILLAR said the dry-strength in fact was adequate; he stressed the importance of using sand of the highest possible permeability. Up to the present, low-phosphorus, high-carbon irons had proved the most satisfactory material for the production of ingot-moulds; alloy additions were to some extent frowned upon and even small traces of carbide-forming elements could—it was thought—produce major cracking. Certain experiments had been carried out with spheroidal-graphite iron, and although this material was of higher cost, the results were promising. The greater expense of the spheroidal-graphite iron could be more than offset by the fact that moulds of this very much stronger iron could be re-designed until they had approximately half the section of a conventional hematite-iron mould. Regarding Mr. Hendy's query about other faults, Mr. Millar said that occasionally a mould would be scrapped in service for a casting detect such as a slag-hole or blowhole which might appear immediately under the skin on the internal surface of the mould, but these rejections were very isolated occurrences and it was practically without exception his experience that ingot moulds failed from "crazing" or major cracking.

Mr. COLLINGE asked if any trouble was experienced with slag or "sludge," when slow pouring, and spoke of the use of a hematite iron having 1.5 per cent. Si and 4 per cent. C. producing good results.

Mr. MILLAR said they had no trouble with cinder and the figures he had given suited mould production in his own foundry.

The meeting concluded with Mr. Booth, branch president, proposing a vote of thanks to the author which was warmly accorded by members.

Northampton Section

On November 27, Mr. L. Clarke visited the Hind Hotel, Wellingborough, to present his paper entitled "Improvements in Surface-finish, Inspection and Fettling of Grey-iron Castings," to the Northampton and district section of the East Midlands branch of the Institute of British Foundrymen. Mr. Clarke is technical and quality manager of John Harper & Company, Limited, whose products cover a very wide range of irons, and castings from ½ oz. to 35 cwt.

The author dealt with his subject in three sections, supplementing his remarks with a series of slides. First he spoke about the surface finish of a casting, which he said was extremely important from the point of view of both dressing costs and the success of further "finishes" which might have to be applied either by enamelling or spray gun. In his own foundry, where cast-to-form press-tools were frequently produced, surface finish was even more important because of the liability of the casting to pass on any imperfections to the pressings. Furthermore, it was vital to have a good finish if the casting was to be gauged accurately and held between close limits in order to avoid unnecessary machining. In this respect, he said, John Harper's were fortunate in having their own sand quarry close to the works, and there was little doubt that the high quality of the naturally-bonded sand obtainable from the quarry was a great help in producing castings with a good surface finish. The company was using synthetic and CO_2-hardened sand for certain jobs and drying some of the moulds for other work, thus ensuring that not only the right metal but the correct sand practice was chosen before making a casting. The author also referred to the value of close co-operation between the foundry staff and the design department, not only to simplify the job for the foundryman but to cheapen the product for the customer.

Mr. Clarke concluded by saying that he had visited over 50 foundries in Europe, and one common fault he had noticed was the generally inadequate arrangements made for dressing castings, which often resulted in a "bottleneck" and hence an unsatisfactory appearance of the casting when despatched to the customer.

An interesting discussion followed presentation of the paper, the author dealing with many questions on the quality of castings, ranging from sand control to fettling-shop accounts.

AT THE SECOND FESTIVAL of "Films in the Service of Industry" addresses will be given by Sir John Cockcroft, O.M., and Mr. Percy Cudlipp, Editor of the *New Scientist*. It is announced that the Council of the British Association for the Advancement of Science will present two additional awards to films (irrespective of category) shown at this year's festival as follows: (*a*) for the film that provides the best exposition of the scientific principles underlying an industrial process, and (*b*) for the film that provides the best exposition to the public of the application of science in industry.

American Letter

Magnesium Association Meeting

The fourteenth annual convention of the Magnesium Association, held in Detroit, October 16 to 17, was attended by about 450 members and guests, and at a luncheon which was held there, Dr. C. J. Smithells (Magnesium Elektron, Limited, London, England), said that, as in the USA, there had been an appreciable decrease in use of magnesium in Great Britain, due primarily to the reduction in that country's defence plans. He said that the greatest deterrent to increase in use of magnesium was its high cost, and a 20 per cent. reduction in cost would remove that obstacle. In Great Britain, he continued, work was being actively pursued with a ferro-silicon reduction process for production of magnesium, which showed bright prospects of being able to cut the cost of magnesium to the required level.

During the meeting some 15 papers were presented on applications of magnesium. Short synopses are given of the papers relating to castings:—

Can Magnesium meet the Challenge of the Automotive Wheel Market? by John A. Main (Kelsey-Hayes Corporation, Detroit). Magnesium is a satisfactory material for wheels, and saves much weight. However, before it can meet the challenge of the automotive-wheel market, lower costs and better performance and styling will have to be achieved.

Vibration Damping-capacity of Magnesium Alloys, by D. F. Walsh, J. W. Jensen, and J. A. Rowland (Bureau of Mines, Department of the Interior, Rolla, Mo.). Magnesium alloys of low alloy content, in the stress range of 500 to 3,500 lb. per sq. in., exhibit higher damping properties than cast iron, whereas those of considerable alloy content have much lower damping capacities. Addition elements which occur as a separate phase, or in solid solution, reduce damping capacity, varying with the particular element, and correlating with the strengthening effect of the addition.

Magnesium in Automotive Applications, by E. L. Schaper, and H. A. Schertel (Dow Chemical Company, Midland, Michigan). Due to an unfavourable price relationship, present-day automobiles incorporate fewer magnesium parts than formerly. From an engineering point of view, an automobile could take up to 351 lb. of magnesium with advantage, replacing 708 lb. of heavier materials.

Magnesium Applications in Airborne Fans, by John Westell (Pesco Products Division, Borg-Warner Corporation, Cleveland). The application of magnesium castings as rotors and housings in axial-flow fans used in aircraft is described. Wall thickness of the castings is about $\frac{1}{4}$ in., with trailing edges $\frac{1}{16}$ in.

Why Allison is using Magnesium, by C. F. Brandenburg (Allison Division, General Motors Corporation, Indianapolis). The use of magnesium castings in jet engines, for such parts as accessory-drive casings; rotor cages; front and rear compressor support assemblies, and front and rear truss ring assemblies on the "cool" side of the engines, are discussed. The high strength-to-weight ratio of magnesium has permitted the design of light-weight functional engine parts; good machining characteristics have produced low-cost engine parts; high damping-capacity has permitted the use of magnesium castings for longer-life aircraft-engine parts, and thorium and rare-earth casting alloys, with elevated temperature properties (especially creep strength), have made possible long-life jet engine parts operating in the 150 to 260 deg. C. range.

Magnesium Castings in Military Photographic Equipment, by Miles J. Mraz and Carvyn Ellman (Chicago Aerial Industries Incorporated, Melrose Park, Ill.). Numerous magnesium-casting applications in cameras, viewfinders, guided missile programming-equipment, camera control units, stabilized mounts, etc., are described.

Cast Bi-metallic Wheel-drums

Kelsey-Hayes Company, America's largest producer of automobile wheel- and braking-equipment, have signed a contract with the Fairchild Engine and Airplane Corporation for the use of its patented Al-Fin molecular bonding process, for production of bi-metallic integral wheel-drums for use on passenger cars. The new wheel-drum consists of an integral cast-aluminium wheel, hub, and drum, bonded to a cast-iron friction-liner, and results in a lightweight, fast-cooling, long-lasting braking system for high-powered cars.

Integral Wheel-drum

The integral wheel-drum is an extension of the similarly constructed Al-Fin brake drum, which has been successfully used for some years, and is gaining increased acceptance in the automobile industry. Last year, Buick became the first American car manufacturer to adopt the bi-metallic drum as standard equipment, with General Motors producing them under Al-Fin licence at its Fabricast Division plant. In addition, Pontiac is to equip its 1959 police cars with them, and European cars, such as Mercedes and BMW, and various American sports models, are also using them quite extensively. Buick, using the drums on the front wheels of all 1959 models, claim that they have the safest, most advanced brake system ever offered on an American production automobile.

In addition to improved braking conditions, rigorous testing in international road races and on American proving grounds has shown that improved ride results, due to reduction in unsprung weight, which, according to one car manufacturer's estimate, is as much as 20 lb. per car. Kelsey-Hayes, after testing their integral wheel-drum design, state that heat dissipation "provides improvement conservatively estimated at 100 per cent. over cast-iron brake designs, and, based on present technology, weight savings ranging from 25 to 40 per cent. are a definite probability."

Al-Fin Process

The Al-Fin process of molecularly bonding dissimilar metals led to the development of the bi-metallic drum, wherein a cast-aluminium structure with radial cooling fins is metallurgically bonded to a cast-iron liner. Unlike a cast-iron drum—which acts as a heat reservoir—the Al-Fin drum serves as a heat exchanger, rapidly conducting the braking heat, without temperature drop at the interface, from the cast-iron liner into the aluminium drum, where it is dissipated quickly into the air pumped over the drum by the 45 exterior fins. This results in longer drum life without distortion, and less frequent lining replacement, as the lower temperatures mean less wear to both braking surface and lining. First introduced in 1941, the process has found widespread application in industrial and military fields, solving many design problems involving heat transfer; strength; wear resistance; joining; weight saving and corrosion resistance, its application ranging from guided missile and rocket components to cooking utensils. Fairchild Corporation maintain a foundry at Deer Park, N.Y., for research and development, and have licensed the bonding process to 52 manufacturers and foundries in the United States, and 13 countries abroad.

American Letter

Copper-scrap Export Trade Decline*

During 1958 foreign trade in scrap metals was adversely affected by the world recession. This was sharply illustrated by the drop in copper-base alloy scrap, exported from the USA, from a monthly average of about 10,000 tons in 1957, to an average of about 3,000 tons in the first nine months of 1958. This represents a startling decline of 62 per cent. Exports of aluminium scrap, however, remained fairly steady during this period.

There has been an interesting change, in 1958, in US government policy concerning exports-imports. Export restrictions have to a large extent been eliminated, but the reimposition of the copper tax, and the restriction by quota of lead and zinc, restrict imports. The imposition of the copper tax has fenced off the American domestic market from the rest of the world, and as a result, the domestic copper price will be higher than the world market price. This makes the USA less competitive in world markets, and is one of the chief reasons for the greatly reduced export of scrap.

* In last week's *American Letter* the article "Scrap Consumption Falls" mentioned a similar recession in the American scrap iron and steel export trade. The above article emanated from Kurt Leburg, president of the (American) National Association of Waste Material Dealers (foreign trade division).

Nickel Strike ends

The long mine-mill union strike at the International Nickel Company works in Canada has ended. It lasted 88 days and following government-sponsored negotiations, both sides made concessions. About 25,000 tons of nickel production has been lost but reserve stocks will probably be sufficient for several months supply. Prior to the strike the plant had been working at only 65 per cent. of its full capacity and many employees were on a 32-hour week. The settlement is understood to provide for a 40-hour week.

Snap-flask for a Three-part Job

By W. Gudgeon

A small non-ferrous foundry, just starting production, received an order for 200 single-groove pulleys, to be made from two split-patterns (Fig. 1 (*b*), 2-in. dia. and ¼-in. broad, each weighing half a pound. As three-part boxes were not on hand in which to perform the work, it was suggested they should be cast by the method known as stack-moulding (Fig. 1 (*a*)), ten castings to be made on each "stack."

Two small snap-flasks were made, 1½-in. deep, with a hinge and snap-catch at opposite corners (Fig. 1 (*c*) and (*d*)).

In preparing the first of the boxes for casting, it was carried from the bench to the floor, and the top and bottom flasks opened out by raising the the small lever. Further moulds were then added, building up one above the other, with a common downgate arranged vertically between the pairs of pulley moulds. To prevent the molten gun-metal from bursting out at the joints of the moulds while pouring, box parts were placed round them and the spaces between boxes and moulds filled with sand and rammed firmly.

The alternative to making the pulleys in this way would have been to make a corebox and form the groove with a dry-sand core. By the method used much time and space was saved, and the flasks were very light and easy to handle.

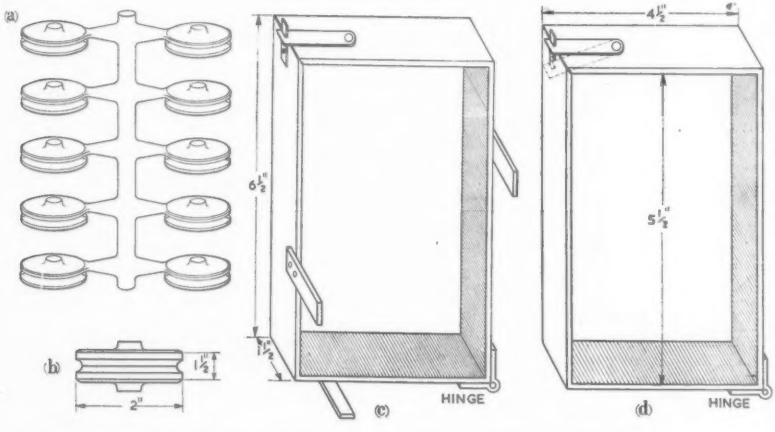


FIG. 1 (*a*) *to* (*d*).—*Illustrated are :* (*a*) *a "stack" of ten cast pulleys;* (*b*) *one of the patterns, split at the groove, and* (*c*) *and* (*d*) *two snap-flasks with hinge and snap-catch at opposite corners.*

Mr. J. P. LEWIS has been appointed general manager of the British "Rema" Manufacturing Company, Limited, Sheffield, a subsidiary of Edgar Allen & Company, Limited, Sheffield steelmakers, etc. He was formerly sales manager of the parent company. Mr. T. R. H. Wadsworth, chief draughtsman in the drawing offices serving both companies, has been appointed assistant general manager of the subsidiary.

HENRY HARGREAVES & SONS, LIMITED, engineers, Bury, Lancashire, are to build a new factory on a six-acre site which on completion will be more than five times larger than the existing premises. The company is working on most of the major contracts of the Atomic Energy Authority and is sub-contractor for the ventilating system at the new Shell headquarters on the South Bank of the Thames.

Personal

As from February 1, the address of Mr. JOHN BELL will be Hill Crest, Dhailling Avenue, Kirn, Dunoon, Argyll.

Mr. A. N. BUTLAND, formerly assistant civil engineer, is now chief civil engineer of British Railways, London Midland Region.

Mr. REGINALD WOOD, Mr. ALEC GILLOTT and Mr. ALBERT W. PRATT have been appointed directors of the Wolverhampton Metal Company, Limited.

Mr. J. S. B. LEA has been elected a director and appointed managing director of Cochran & Company, Limited, engineers and boilermakers, Annan.

Mr. HERBERT PEARSON, pattern fitter at the East Hecla Works of Hadfields, Limited, Sheffield, retired recently, after 40 years' service with the company.

It is reported that Dr. A. J. KESTERTON will not now be taking up his appointment as managing director of Davy British Oxygen, Limited, as announced by that firm last month.

Mr. LIONEL TEASDALE, of Newton, Chambers & Company, Limited, Sheffield, has been presented with a chiming clock by colleagues on his retirement after 63 years as a moulder.

A special meeting of Dudley Town Council will be held on February 24, to confer the Freedom of the Borough on Mr. C. E. LLOYD the well-known iron and steel industrialist and a former M.P. for Dudley.

Mr. H. HODGSON has been appointed company secretary of the Tees Side Bridge & Engineering Works, Limited, following the retirement of Mr. A. E. Reyer, who served the company in that capacity for over 31 years.

Mr. R. H. HOWE has been appointed managing director of Hobourn Aero Components, Limited, a member of the Thomas Tilling Group. Mr. PERCY HOBOURN has retired as managing director but remains executive chairman.

Mr. T. D. RICHARDS, managing director of W. Richards & Sons, Limited, ironfounders, Britannia Foundry, Middlesbrough, has presented gold watches to 15 long-service members of the staff, including Mr. W. R. PINKHAM, a director and secretary, with 48 years' service.

Following on the news that Sir ARCHIBALD FINLAYSON FORBES is to give up the chairmanship of the Iron and Steel Board towards the end of February comes the announcement that he is to succeed LORD BAILLIEU as chairman of the Central Mining and Investment Corporation, Limited, and Central Mining Finance, Limited, its wholly-owned subsidiary, on March 1.

Mr. R. E. SHERWOOD has been appointed manager of the steel department of Edgar Allen & Company, Limited, Sheffield. Mr. Sherwood who joined the magnet department of the company in 1938 was transferred to the steel foundry in 1946. Since 1950 he has been concerned with the heat-treatment section of the steel department, of which he became assistant manager in 1952.

Mr. A. C. ARROL has been appointed a director of Sir William Arrol & Company, Limited, Glasgow. Mr. F. P. MACRAE and Mr. V. CARNEGIE are to be special directors at the Dalmarnock establishment, and Mr. A. DAVIS and Mr. W. RAESIDE are to be special directors at the Parkhead works. Mr. P. B. TUCKER has resigned from the position of crane works manager and from the office of director of the company.

Sir WILLIS JACKSON, director of research and education, Metropolitan-Vickers Electrical Company, Limited, has accepted an invitation to act as chairman of a committee, set up by the President of India, to review the work of the Indian Institute of Technology, Kharagpur. Sir Willis, who left for India on January 8, will also participate in the Indian Science Congress to be held in New Delhi from January 21-28.

Mr. A. R. WOODWARD, B.SC., A.F.R.AE.S., has been appointed head of the joining division of the development department at Aluminium Laboratories, Limited, Banbury. Mr. Woodward, who was educated at King Edward VI School, Stourbridge, and Birmingham University, joined the company in 1948 as a research investigator and worked for a number of years on the mechanical properties of aluminium, including fatigue.

Miss TINA HENSBY, 24-year-old clerk at the steelworks of William Jessop & Sons, Limited, Brightside, Sheffield, has been selected from 400 applicants for the post of secretary-cook with the expedition to seek the reputed £4,000,000 treasure of the sunken Spanish galleon, Santa Cruz. When the expedition sails in April she will be the only woman among the trawler crew of 13. The leader of the expedition is Mr. Tom Seel, a 37-year-old engineer of Nelson, Lancashire.

Lancashire Dynamo Holdings, Limited, announce the appointment of Mr. D. C. LORKIN, F.C.I.S., previously joint managing director with Mr. S. F. STEWARD, C.B.E., as the managing director of the company. This appointment is consequent upon Mr. Steward's resignation of the position of joint managing director of the company and his appointment as director-designate of the British Electrical and Allied Manufacturers Association. Mr. Lorkin joined Lancashire Dynamo & Crypto, Limited, in 1932, becoming a director in 1946 and managing director of LDC in 1951, a position he still retains.

Already a director of two of the subsidiaries of Holman Bros., Limited—Climax Rock Drill & Engineering, Limited, and Maxam Power, Limited—Mr. J. M. WILLIAMS, has been appointed an associate director of the parent company. He has moved from the company's Camborne headquarters to take up the position of London director at 44, Brook Street, W.1. Mr. Williams, who was born in 1927, practised in London for a time as a solicitor. He was in charge of the reorganization and administration arrangements in the Camborne area last year when Holman Bros. acquired control of Climax Rock Drill & Engineering and integrated the operations of the two companies.

Mr. E. C. B. ROWLEY retired from the board of Harrison (Birmingham), Limited, brassfounders, Bradford Street Works, at the end of last year, after 29 years with the firm. Mr. Rowley joined the staff of Guest, Keen & Nettlefolds, Limited, of Smethwick in 1919, and became chief sales organizer. In 1929 he was appointed general manager of Harrison (Birmingham) Limited, and four years later joined the board and became chairman in 1946. He relinquished the chairmanship in 1957. For many years Mr. Rowley was a member of the executive committee of the National Brassfoundry Association, and in 1951 was elected a life honorary vice-president. He has been chairman of the Stamped Brassfoundry Association and was founder-chairman of the British Curtain Rail Manufacturers Association from its inception in 1931 until 1958. He was the guest of honour at a lunch given by the chairman and directors of the firm at the Queen's Hotel, Birmingham, when he received a presentation of a silver salver and cheque for £165. The cheque will be included in the gift of 200 guineas which Mr. Rowley is making to the Royal Metal Trades Pension and Benevolent Society.

News in Brief

THE 11TH LIEGE INTERNATIONAL FAIR is to be held from April 25 to May 10. Details are available from Mr. R. C. Liebman, 178, Fleet Street, London, E.C.4.

E. P. BARRUS (CONCESSIONAIRES), LIMITED, of 12-16, Brunel Road, Acton, London, W.3, have opened a branch in Manchester at Deansgate House, 274, Deansgate, Manchester 3.

THE EIGHTH ANNUAL luncheon for retired long-service employees, 78 of whom attended, was held by the David Brown Companies at Park Works, Lockwood, Huddersfield, last Friday.

THE SOUTH-EASTERN AREA OFFICES of Birlec Limited, and Birlec-Efco (Melting), Limited, are now established at Crown House, Aldwych, London, W.C.2 (Telephone: TEMple Bar 8040).

STORAGE PROBLEMS of the Peterborough firm, F. Perkins, Limited, diesel-engine manufacturers, have been alleviated by the acquisition of an army ordnance sub-depot at Walton, Peterborough.

THE FIFTH INTERNATIONAL AUTOMATION EXPOSITION will be held at the New York Trade Show Building, 500 Eighth Avenue (between 35th and 36th Street) New York City, from November 16 to 20.

DURHAM RAW MATERIALS, LIMITED, 1-4, Great Tower Street, London, E.C.3, announce that they have been appointed sole selling agents in the UK for the full range of filter presses manufactured by F. H. Schule, Limited, Hamburg 26.

NEARLY 200 CHILDREN attended a New Year party, given by Bamfords, Limited, agricultural engineers and founders, of Uttoxeter, at the Town Hall, Uttoxeter, on January 3. A party for 300 adults followed that given for the children.

THE BOROUGH POLYTECHNIC, Borough Road, London, S.E.1, announce that a course of eight lectures on "Friction and lubrication," to be given by a panel of specialists, will start Wednesday, January 21, at 7 p.m. The fee for the course is £1.

QUALCAST, LIMITED, lawn-mower manufacturers, and suppliers of metal castings to the motor-car and other industries, announce the building of a new foundry plant at Derby, at an estimated cost of £500,000. It is expected to be in operation by June.

PLANS FOR THE THIRD AND FOURTH PHASES of extensions to Barnsley College of Technology, and the expenditure involved of £219,448, have been approved by the Minister of Education. Formal consent for a loan for this purpose has also been received.

ANY FOUNDRY CONCERNS which are thinking of manufacturing souvenirs in connection with the forthcoming Royal Visit to Canada should write to the Export Services Branch of the Board of Trade, Room 802, Lacon House, Theobalds Road, London, W.C.1, for an outline of the conditions to be met.

TWENTY EMPLOYEES of the North British Steel Foundry, Limited, Bathgate, recently received long-service awards from Mr. G. M. Menzies, chairman and managing director. In congratulating the recipients, Mr. Menzies mentioned that nine men had 40 years' service and 11 had 25 years' service.

BRIGHTSIDE HEATING & ENGINEERING COMPANY, LIMITED, has set up a prototype of a new air-conditioning system in its offices in Don Road, Sheffield. The system has been developed over three years and is a dual-duct system which mixes warm and cool air to provide the thermostatically-controlled temperature required.

A NEW SERIES OF FILMSTRIPS dealing with the history and basic principles of important scientific developments has been announced by the Mullard Educational Service. The first strip, entitled "The History of Radio," is now available from the distributors, Unicorn Head Visual Aids, Limited, 42 Westminster Palace Gardens, London, S.W.1.

A CONTRACT for the supply of 60 diesel-engined road tankers, valued at over £250.000, has been placed with Leyland Motors, Limited, by the National Iranian Oil Company. The vehicles, which are required for fuel distribution throughout the mountainous country of Iran, will augment a fleet of over 400 Leyland vehicles already operated by NIOC.

AT A MEETING of the Scottish section of the Association of Bronze and Brass Founders, members were reminded that the requirements of the Thermal Insulation Act came into force on January 1, and that it will affect all new works premises built after that date. However, shops where metal melting takes place may not require to be insulated.

CHARLES ROBERTS & COMPANY, LIMITED, Railway Wagon Works, Horbury Junction, near Wakefield, have received contracts from the Nigerian State Railways for 19 bogie passenger brake vans and 100 low-sided wagons. The company states that sufficient orders are now in hand to maintain the present rate of production for the whole of 1959.

SOME MONTHS AGO, Wild-Barfield Electric Furnaces, Limited, of Watford, Herts, announced that an order had been received for mains-frequency induction-heated aluminium-holding furnaces valued at approximately $300,000 from a large organization in the United States. It is now stated that a further order for similar 750-lb. capacity equipments has been placed by the same firm.

BTR INDUSTRIES, LIMITED, announce than an agreement has been reached in principle whereby the company acquires the whole of the capital of Microcell, Limited, and of the associated companies, Glass Yarns and Deeside Fabrics. Limited, and Artrite Resins, Limited. Mr. Henry Kremer, chairman and managing director of Microcell, will continue in that capacity and will join the board of BTR Industries.

UNDER AN AGREEMENT between R. Cruikshank, Limited, manufacturers of industrial chemicals and plating plant, of Birmingham, and the Pennsalt International Corporation, S.A., the Birmingham firm is to manufacture and sell in the UK a wide range of Pennsalt products for the metal industries. It will also carry out the sale of these products to certain overseas countries. In addition, a special agreement with the Pennsalt Chemical Corporation of the US will allow the company to use the Pennsalt trade marks.

SEVENTEEN TRACTORS, the products of the International Harvester Company of Great Britain, Limited, from their works at Idle, Bradford, and Wheatley, Doncaster, together with six combine harvesters, produced by the same company, were recently delivered in convoy to the 3,000-acre farm of J. B. Everatt, Limited, at Garthorpe, Crowle, near Goole, by the Doncaster agricultural machinery agents of P. Platts & Sons, Ltd., Market Place, Doncaster. This £25,000 order is probably the largest single order placed in this country by one farmer.

BRITISH WATERWAYS have placed an order with Fleming & Ferguson, Limited, Paisley, Renfrewshire, for five diesel-driven bucket dredgers for use on the Aire & Calder and Sheffield & South Yorkshire Navigations in replacement of four obsolete steam dredgers.

The new dredgers, of special design, with retractable superstructure to enable them to negotiate low bridges, will have a dredging capacity of approximately 70 tons per hour at a speed of 20 buckets per min., special chutes enabling the dredgings to be passed to hopper boats at either port or starboard.

ALL INDUSTRIAL and commercial consumers will benefit from the distributed rebate of £350,000, the total saved on the purchase of power supplied by the North Eastern Electricity Board. These users have in their tariffs an element which varies with the price of coal at power stations. Other consumers do not pay this, and the board, announcing its new tariffs last week, said it was only fair that the industrial and commercial users should reap the benefit. The new system starts on April 1. A lower off-peak rate for electricity is also to be introduced.

BRITISH POLAR ENGINES, LIMITED, Glasgow, are to take over the production of a range of marine engines at present being manufactured by H. Widdop & Company, Limited, of Keighley, Yorks. It is expected the transfer will be completed in about three months, states Associated British Engineering, Limited, the parent company of both concerns. According to Mr. David Bruce, managing director of British Polar Engines, Limited, the transfer will mean a significant increase in the numbers employed at Glasgow, although a few men will be transferred from the Keighley works.

AS A RESULT of a substantial increase in the home demand for Kanigen plated components, Albright & Wilson (Manufacturing) Limited, sole UK licensees, announce that two additional plating tanks have been installed in their plant at Oldbury, Birmingham. Kanigen chemical nickel plate is a nickel/phosphorus alloy containing about 8 per cent. phosphorus. It has extremely low porosity and is hard (1,000 VPN. after heat-treatment) and corrosion and wear-resistant. On ferrous materials the plate prevents contamination of liquids by iron from pumps, pipework and containers.

THE FACTORY established in Shotts, Lanarkshire, by the Cummins Engine Company, of Columbus, Indiana, two years ago, is to be extended by 70 000 sq. ft., and, subject to Government approval, a further 17 acres of ground will be reserved for future development. The factory, which at present employs 400 persons, produces diesel engines from 150 to 330 h.p. for the export market, including Canada, and according to Mr. P. Every, factory manager, plans are being made for the manufacture of engines of lower and higher horsepower. It is expected that it will take about a year to complete the new building.

A TWO-WEEK STUDY TOUR of German industry for foremen and forewomen from British industry has been organized by the Industrial Welfare Society. The purpose is to study the German approach to personnel work, training, labour relations, etc., and to give delegates the opportunity to find out the duties and responsibilities of their opposite numbers in that country. The tour will take place from April 11 to 24 and the party—which is limited to 40—will be based on Düsseldorf. Further details may be obtained on application to Mr. P. Bowman, Press officer of the Society, at 48, Bryanston Square, London, W.1.

THE REDUNDANCY PROBLEM in the fitting-out department of Harland & Wolff, Limited, Belfast, will be eased by the arrival of the 28,160-ton Orient liner Orcades, which is to be completely air-conditioned during the next three months. Many men in the department were paid off recently after completing the new Union Castle liner Pendennis Castle. Another passenger liner, the Arcadia, due to arrive in Belfast in April is scheduled for the same operation. Future orders include air-conditioning of five more ships belonging to the P. & O. and Orient lines. Recently, Harland & Wolff launched a cargo vessel, the Rosebank, one of four being built for the Bank line.

MORGAN CRUCIBLE COMPANY, LIMITED, Battersea Church Road, London, S.W.11, recently "came to the rescue" when a crisis developed at the *Daily Telegraph* pet-centre stand at the Schoolboys' Exhibition, at Earls Court. Ponies were being shod by a farrier on the stand, and on the Earls Court Safety Authorities refusal to allow an open-flame forge furnace to be used, Morgans were asked for help. Within a few hours, the company had despatched and installed a small electric heat-treatment furnace, which was heated by the company's new silicon-carbide heating element, Crusilite. This has many potentialities for industrial furnace heating, but it was the first time it had been used for making horseshoes.

LONGCLOSE ENGINEERING COMPANY, LIMITED, makers of dyeing machinery and stainless-steel vessels, held an "open-day" for families of employees at their new factory and offices at Crescent Works, Dewsbury Road, Leeds, on January 10. The factory, 400-ft. long has a floor area of 52,000 sq. ft. It was in 1917 that the company was founded under the name of the Longclose Foundry Company, Limited, for production of chill-cast brass bars for shell noses; in 1919 it became the Longclose Engineering Company, Limited, when production of dyeing machinery was commenced. The firm became a subsidiary of Platt Brothers & Company (Holdings), Limited, (now Stone-Platt Industries, Limited) of Oldham, in 1954. One of the machines made by the company was used to dye the yarn for the Coronation carpet for Westminster Abbey.

Honour for Mr. A. Le Thomas

Mr. A. Le Thomas, managing director of the *Centre Technique des Industries de la Fonderie* (technical centre for the French foundry industry) and founder chairman of the *Association Nationale de la Recherche Technique* (French national association for technical research), has been promoted Commander of the Legion of Honour, one of the highest grades in that Order.

Mr. A. Le Thomas was born in Brest in 1893, and studied at the *Ecôle Polytechnique* in Paris. From the outset of his career, he headed various technical and research activities in Government bodies and private institutions. At the end of 1939, he was appointed head of the (French) Ministry of Munitions foundry mission. Mr. Le Thomas was twice vice-chairman of the *Association Technique de Fonderie Française*, and was awarded the *Association's* gold medal in 1933 and its medal of honour in 1951. He is a member of the National Productivity Council and since its foundation in 1942, has directed the *Centre Technique*. He has contributed to the work of various Ministerial and inter-industrial bodies concerned with the organization and development of research on a national scale, one such being the *Conseil Superieur de la Recherche Scientifique et du Progrès Technique*. He has also personally conducted numerous enquiries and research projects, many of which have provided material for original monographs or other documents on the metallurgy of cast iron, bronze and brass, etc. As an artillery officer in the first world war, Mr. Le Thomas was seriously wounded on the Vardar in 1916; he also took part in the fighting before Rheims in 1918.

Company News

BICC/Telcon Merger

Details of the offer by British Insulated Callender's Cables, Limited, for the share capital of the Telegraph Construction & Maintenance Company, Limited (Telcon), have been circulated to shareholders and Telcon directors indicate that they intend to accept the offer in respect of all the shares, both preference and ordinary, owned by themselves and recommend acceptance to other shareholders.

BICC is offering three £1 ordinary shares in exchange for every four £1 ordinary Telcon. Holders of Telcon's 5 per cent. £1 redeemable preference shares are offered a one-for-one exchange into BICC 5½ per cent. £1 second cumulative preference shares. A holder of 100 Telcon ordinary will receive a gross dividend of £9 7s. 6d. instead of £8 10s. as at present.

In addition to the creation of 500,000 second preference shares of £1 BICC proposes to create 2,500,000 additional ordinary shares of £1. After the issue to ordinary shareholders in Telcon the present margin of authorized but unissued capital will be virtually unchanged.

MORGAN CRUCIBLE COMPANY, LIMITED—With the aim of achieving a more even distribution between interim and final payments the company is paying an interim dividend of 5 (3¼) per cent. in respect of the year ending March 31, payable on February 2. Group profits for the first six months of the financial year are not higher than in the previous year.

KITCHEN & WADE, LIMITED, drilling and boring machine manufacturers, of Halifax—At an extraordinary meeting the reduction of capital by the repayment of 2s. 6d. per 4s. ordinary share was approved. An immediate application is being made for court confirmation and, as announced, the board intends to restore ordinary shares to 4s. by capitalization.

NEWMAN, HENDER & COMPANY, LIMITED, iron and non-ferrous founders, etc., of Stroud (Glos)—The company has acquired the issued share capital of the Humber Brass & Copper Works Company, Limited, a company largely concerned in the fitting out of vessels built in the Humber area with valves and pipework. It is thought that the acquisition will be of advantage, broadening the scope of the company's business.

TECALEMIT, LIMITED, high-pressure lubrication specialists, of Brentford (Middx)—Group net profits increased from £131,949 to £174,998 after tax of £179,527 (£173,362) in the year ended July 31, 1958. A 7 per cent. final dividend makes 11 per cent., as before, and a special interim of 2 per cent. is declared on account of the current financial year. In the opinion of the directors the increased profits would have justified a total dividend of 13 per cent. for the year, but in view of the incidence of profits tax they declared the special interim dividend.

DAVID BROWN CORPORATION, LIMITED, engineers, steel and non-ferrous founders, etc., of Huddersfield—Orders received were some £1,200,000 higher than the previous year and the turnover was the highest in the company's history. Over 50 per cent. of the group's products were exported and an order-book in excess of £7,000,000 is carried, ensuring more than sufficient work for the general gearing, machine-tool, and automobile divisions for the rest of the current year. Group net profit for the year to June 30, 1958, was £234,334 (£177,750) and no dividend (same) is declared.

Board Changes

Hadfields, Limited

Changes in and additions to the boards of certain of its subsidiary companies are announced by HADFIELDS, LIMITED, the Sheffield steelmakers. Mr. E. W. Colbeck becomes deputy chairman in addition to managing director of Hadfields Steels, Limited, and Mr. George Wood, Mr. Fred Cousans, and Mr. G. J. Jenkins have joined the board of the company. Mr. W. Jenkins Gibson has been appointed deputy chairman, and Mr. George Wood managing director of Hadfields Forgings, Limited. Mr. T. Pease and Mr. D. R. Ward have joined the board. Major H. G. Freeman is now deputy chairman and Mr. Fred Cousans managing director of Hadfields Foundry & Engineering Company, Limited. Additions to the board of that company are Mr. F. Holmes and Mr. G. J. Jenkins. The various changes in the group follow closely upon the additions to the main board of Hadfields, Limited, and the further appointments to the local directors, all of which have been announced recently. Mr. Harold Humphries, deputy chairman and managing director of Hadfields, Limited, is chairman of the three subsidiary companies referred to above.

MIDLAND ALUMINIUM, LIMITED—Mr. A. U. Webster has been appointed to the board.

BRECKNELL, DOLMAN & ROGERS, LIMITED—Mr. J. McLaren has resigned his directorship.

A. P. V. COMPANY, LIMITED—Mr. H. P. N. Benson has been appointed deputy managing director.

BRIGHTSIDE ENGINEERING HOLDINGS, LIMITED—Mr. L. Graham Firth has been appointed to the board.

RANSOMES SIMS & JEFFERIES, LIMITED—Mr. L. W. Bryant has joined the board and continues as secretary.

CROMPTON PARKINSON, LIMITED—Mr. R. R. Kenderdine has been elected a director and appointed a managing director.

MILLSPAUGH, LIMITED—Mr. H. M. Smith has been appointed a director. Mr. C. A. Erberle has resigned from the board.

BRITISH THOMSON-HOUSTON COMPANY, LIMITED—Mr. L. Drucquer has relinquished his directorship following his appointment as chairman of the A.E.I. Divisional Management Company, Limited, and divisional director and general manager of the A.E.I. heavy plant division.

STURTEVANT ENGINEERING COMPANY, LIMITED—Mr. H. W. Wagner has been appointed chairman. He succeeds Mr. G. R. Thursfield, who has resigned owing to advancing years. Mr. Thursfield, who has completed over 60 years with the company, became a director nearly 44 years ago and has been chairman for the last 17 years.

FURNESS SHIPBUILDING COMPANY, LIMITED—Mr. J. H. Cross, joint managing director, has relinquished his position, but retains his seat on the board. He has a record of 40 years' service at the company's Haverton Hill-on-Tees Yard. Mr. W. T. Butterwick, joint managing director, becomes sole managing director, and Mr. A. A. McNaughton, commercial director and secretary, has been appointed assistant managing director.

Mr. MAURICE LESLIE HALL, secretary and director of Yates Haywood & Company, Limited, general iron-founders and stove grate manufacturers, Rotherham, has died at the age of 58. He joined the business in 1919 and was appointed secretary and director when it was incorporated in the present firm in 1952.

Physical Society Exhibition

The Physical Society Exhibition will be held this year in the Royal Horticultural Society's Halls, Westminster, London, from January 19 to 22. Amongst the stands which will be of interest to foundrymen are the following:—

CAMBRIDGE INSTRUMENT COMPANY, LIMITED (*Stand No. 105*), will show the Transrite cardiograph Mk. II; electrochemical dissolved-oxygen analyser, Mk. III (gas-phase transfer type); general purpose polarograph, and an automatic chart analyser. This analyser will be of interest because industrial quality-control often makes it necessary to determine the percentage amount of material which falls within given tolerances. A typical case is the measurement of strip thickness, usually done manually by measuring at about 1 in. intervals—a laborious method. The analyser (patent applied for) automatically "samples" a recorder chart at intervals of 1 mm.

EDWARDS HIGH VACUUM, LIMITED, are showing a range of rotary high-vacuum pumps; ultra-high vacuum equipment; vacuum-measuring instruments; leak-detection equipment; vacuum-coating plant, and metallurgical and distillation plant. Exhibits of particular interest are three large-capacity rotary pumps; two sizes of mechanical boosters, based on "Roots"-type blowers; the "Speedivac" (model 5) penning gauge; an electron-beam welding apparatus, and a vacuum-fusion gas-analysis unit. This apparatus is a compact self-contained unit for the analysis of oxygen, nitrogen and hydrogen in metal samples. Metal construction is used wherever possible, the apparatus being designed to overcome the difficulties experienced with glass equipment. Metal samples are melted in a vertical graphite-crucible assembly, contained in a water-cooled silica furnace tube mounted in a stainless-steel header, and can be introduced as required through a vacuum lock. The crucible is inductively heated to a maximum temperature of 2,400 deg. C. by a 6 kw. high-frequency generator.

GRIFFIN & GEORGE GROUP of companies will be exhibiting the Griffin-Raleigh elution bridge; a pan-metron bridge; Bateman's jet-reaction apparatus; the Griffin VPC apparatus (Mk. 2B), and a water deionizer. The latter is designed for regeneration *in situ*, and is suitable for laboratory and small-scale production use. Unlike equipment requiring the use of expensive replacement resin cartridges, the resins in this unit may first be separated by elutriation and then simultaneously regenerated without removal from the column. By this means high-grade deionized water is made available at a cost of approximately 3d. per 20 gall. when using London mains influent. Two models are available having capacities of 16, and 64, gall. regeneration respectively.

KELVIN HUGHES GROUP will display a range of precision instrumentation on their stand in the New Horticultural Hall. The exhibits include a direct-reading current meter; the Syncrotel transmission system; a stabilized power-pack for klystrons; a precision slide-wire potentiometer; force-balance system for pressure measurement; air-data computer; periscopic sextant with sky compass facility, and a twin-channel flaw alarm. This unit (mains consumption 80 w.) is designed for use in conjunction with the Kelvin Hughes ultrasonic flaw-detector (Mk. 5), and automatically registers the presence of flaws in a specimen under test.

Lost wax casting originated with the Chinese many years B.C

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The first Investment Caster
Was a famous Chinese Master
Known to all as Y-Fling-Ye,
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In size, speed and metal range
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Raw Material Markets

Iron and Steel

For many of the ironfoundries the immediate prospects are not very encouraging, but it is too early as yet to forecast with any assurance the trend of business for 1959. Overall orders on hand for castings at present are less numerous than in past years and the light, textile, and many of the jobbing foundries will continue for the time being, at any rate, to work below capacity, involving short-time working and, in many instances, redundancy of labour. Within the last month or two the bigger demand for domestic equipment has reduced stocks and increased orders for the light foundries supplying this trade, but at many other units there is little improvement. For builders' castings the call is disappointing, and the substitution of alternative materials affects adversely the usage of iron castings. With easier trading conditions and removal of restrictions, hopes continue to be entertained of a revival in business for these foundries.

The trading position at the engineering and speciality foundries is, fortunately, on more favourable lines. Demand for high-duty castings keeps up at reasonably good levels, although there is room for improvement in this section. The foundries supplying to the machine-tool industry are not receiving orders for castings for the same quantities as previously and present outputs are consequently much lower. Many other trades have also reduced their demands, including heavy engineering and the railways. The motor-car industry, while not scheduling so heavily as before, continues to take up appreciable quantities of castings and expects further to increase its demands.

Raw materials are available for the foundries in larger quantities than are being called for at present. Blast-furnace capacity is not being fully utilized, but present production of pig-iron exceeds requirements. All grades of foundry irons and hematite are plentiful and makers are hopeful that demands from the foundries will shortly enable them to dispose fully of their outputs and also to reduce the stocks on hand.

Most grades of scrap are adequate for current needs, although arisings of the better and heavier grades of cast-iron scrap are readily absorbed. Foundry coke deliveries are satisfactory, and ganister, limestone, and firebricks continue to be available to requirements.

Stocks of raw materials at the foundries are low, and with the uncertainty of the future and the lack of forward buying there is no inclination to carry stocks; in fact, this position is accentuated by the fact that requirements can be obtained promptly from stocks held by suppliers.

Business continues quiet at the re-rollers and at present levels of demand most of the mills will continue to work on a short-time basis. The call for small bars and light sections is moderate and rolling programmes are difficult to arrange even for the reduced number of shifts. Steel semis are plentiful and home steelworks can increase deliveries when the need arises. At present, however, the re-rollers are ordering only those supplies which are needed for orders on hand and stocks are kept at minimum levels.

Non-ferrous Metals

Copper continues steady with the undertone firm in London and in New York. In London the market is active, a heartening feature being the improved demand from western Germany. The price is again edging upwards and the hold-up in supplies from Rhodesia has led to a widening of the backwardation. On Monday, in fact, prices were the highest for almost two months. Demand is confined mainly to stocktaking activities with the offtake from industry being of a routine nature. The Board of Trade has invited tenders for about 7,500 tons for delivery in equal instalments over the next five months beginning next month. It will be recalled that the Board of Trade is disposing the whole of its remaining stocks amounting to 30,000 tons, of which about 14,500 tons would be sold by auction by open tender for delivery and pricing during the period February to November, 1959.

In the United States, the futures market is active and prices are trending towards higher levels. The custom smelter price was raised by ¼ cent to 29½ cents a pound at the beginning of this week. Offerings of scrap have recently tended to dry up and smelters have increased their buying price to 23¼ cents a pound. The current round of optimism in the United States has prompted the Howe Sound Company to announce that steps are being taken to reopen the Britannia copper mine in British Columbia which closed down at the beginning of 1958 because of the low copper prices then ruling. The other item of interest is that, effective from January 2, 1959, Kennecott Copper owns the huge copper smelter formerly owned and operated by the American Smelting & Refining Company. This acquisition enables Kennecott to have complete control over the entire sequence of copper production from its mines in the United States.

Tin seems to have come out of the doldrums and, with demand showing an improvement from both sides of the Atlantic and from the East, the quotation has risen sharply. In fact, the cash price in London rose £11 a ton last week and some observers expect the quotation to penetrate its previous high of £767 a ton over the next few weeks. Stocks in London are decreasing and consumption in the USA is steadily increasing, the rise in consumption in October, 1958, over a year ago being about 9 per cent. In the US the price is fluctuating around 99 cents and $1.00 a pound.

Lead continues featureless both here and in New York, where the price is holding at 13 cents a pound. In London, market interest and activity is at a low ebb and there is plenty of metal about to satisfy anticipated demand. All this, however, should not mask the fact that world demand is at a higher level than that ruling in the middle of 1958 and is expected to remain so.

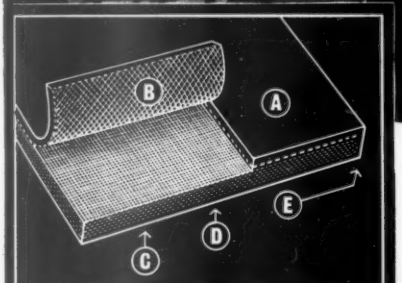
Zinc remains relatively firm with buying being concentrated on nearby supplies. The backwardation is still there in London and the trend of buying behaviour indicates that it will remain. In the US, demand is quietly steady and the price is firm at 11¼ cents.

Information as to the US import quotas for lead and zinc show that all the quotas were filled and that sufficient metal is stored in bonded warehouses in the United States to take care of the quotas for the second period beginning this month.

Continental Oxygen-steelmaking Processes

By arrangement with the Iron and Steel Institute, the nine papers which were presented on the first day of the *Journées Internationales de Sidérurgie* in Liège, last June, have been translated into English and have appeared at fortnightly intervals in our sister journal the *Iron and Coal Trades Review*. It is proposed to issue all these in a combined reprint, forming a special booklet, which it is hoped will be ready at the end of this month. The cost per copy will be 10s. 6d., post free, and those interested should send their orders, together with remittance, to the publisher at 17/19, John Adam Street, Adelphi, London, W.C.2.

One of a series of Goodyear equipped conveyors at the South Bank Coke Ovens of Dorman Long (Steel) Ltd.



SEE THE RUGGED CONSTRUCTION OF GOODYEAR CONVEYOR BELTING

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- **C** Plies of close-woven rayon or cotton duck, mildew inhibited.
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- **E** Substantial edge cover resists side wear.

The right choice for rugged jobs

GOODYEAR CONVEYOR BELTING

WHATEVER YOU HAVE to convey—hot sinter or abrasive coke, wet ash or uncrushed stone — you'll find there's a tough Goodyear belt to give you more output at lowest cost per ton. Special features of these 'job-designed' belts include: correct troughing, high impact resistance and flex life, resistance to mildew. Many thousands of installations at steelworks, power stations, mines, quarries and factories have proved their endurance and reliability in the most exacting conditions — confirming that Goodyear Conveyor Belting is the wise choice when conditions are exacting.

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Imports and Exports of Iron and Steel in November

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in November, 1958. Totals for the first eleven months of last year and 1957 are also included.

Total Exports of Iron and Steel

Destination.	Month ended Nov. 30.	Eleven months ended November 30.	
	1958.	1957.	1958.
	Tons.	Tons.	Tons.
Channel Islands	391	3,358	4,188
Cyprus	328	11,585	5,403
Sierra Leone	814	12,651	11,311
Ghana	1,454	20,832	14,315
Nigeria	9,145	51,272	63,745
Union of South Africa	17,552	100,968	98,540
Rhodesia and Nyasaland	1,451	60,887	30,593
Tanganyika	1,726	20,396	13,816
Kenya	3,470	46,424	37,467
Uganda	222	3,691	2,927
Mauritius	413	3,123	3,188
Aden	146	4,486	2,683
Bahrein, Qatar, and Trucial States	1,207	15,345	8,600
Kuwait	2,287	34,653	37,463
India	13,832	205,476	135,154
Pakistan	2,297	62,039	50,145
Singapore	2,605	36,481	31,033
Malaya	1,617	29,623	14,527
Ceylon	5,080	25,031	28,556
British North Borneo	133	3,704	1,862
Hongkong	5,668	73,562	53,611
Australia	12,013	170,278	96,480
New Zealand	21,107	198,119	174,355
Canada	21,419	259,789	173,368
Jamaica	1,944	23,944	19,797
Trinidad	4,607	47,462	46,248
British Guiana	388	6,923	6,363
Other Commonwealth countries	8,453	26,492	42,704
Eire	4,385	41,551	45,292
Finland	4,846	77,843	46,037
Sweden	9,904	99,229	111,502
Norway	8,716	96,069	85,283
Denmark	6,185	95,682	77,585
Western Germany	8,146	9,076	52,311
Netherlands	6,585	89,113	73,925
Belgium	6,078	41,464	36,806
France	235	14,779	4,033
Switzerland	660	15,205	8,778
Portugal	1,029	15,569	12,877
Spain	2,266	36,175	40,300
Italy	2,448	50,640	44,633
Austria	221	4,938	8,716
Yugoslavia	574	10,153	4,015
Greece	604	10,774	11,883
Turkey	315	8,108	4,099
Netherlands Antilles	201	2,868	1,961
Portuguese East Africa	258	3,836	2,505
Egypt	617	9,319	12,410
Sudan	1,966	18,322	31,544
Lebanon	8	16,168	8,644
Israel	2,146	4,190	9,095
Saudi Arabia	143	4,138	3,813
Iraq	6,669	36,038	37,975
Iran	3,758	55,253	36,770
Burma	1,252	23,154	10,997
Thailand	532	7,236	6,469
Indonesia	360	6,268	2,133
Philippine Republic	397	7,062	3,396
USA	10,381	45,266	79,966
Cuba	486	7,968	5,724
Colombia	125	8,660	5,264
Venezuela	1,997	107,043	60,672
Ecuador	77	2,725	2,235
Peru	321	12,316	9,526
Uruguay	24	6,034	849
Argentina	7,514	104,349	119,769
Other foreign countries	32,336	133,367	160,060
TOTAL	276,534	2,897,142	2,488,294

Total Imports of Iron and Steel

From	Month ended Nov. 30.	Eleven months ended November 30.	
	1958.	1957.	1958.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	—	5,573	5,627
Canada	2,046	40,722	20,350
Other Commonwealth countries and Eire	861	21,389	20,629
Soviet Union	—	229,062	108,945
Sweden	2,381	30,713	32,170
Norway	4,799	107,469	65,762
Poland	146	7,546	319
Western Germany	1,021	97,735	63,038
Netherlands	17,360	70,706	136,688
Belgium	1,214	135,901	87,588
Luxembourg	223	23,338	6,034
France	782	63,729	17,533
Italy	253	4,036	7,048
Austria	24	59,845	3,770
Japan	155	14,025	3,151
USA	232	273,106	115,118
Other foreign countries	496	19,477	7,372
TOTAL	31,993	1,204,372	702,022
Iron and steel scrap and waste, fit only for the recovery of metal	1,139	649,105	63,496

Exports of Iron and Steel by Products

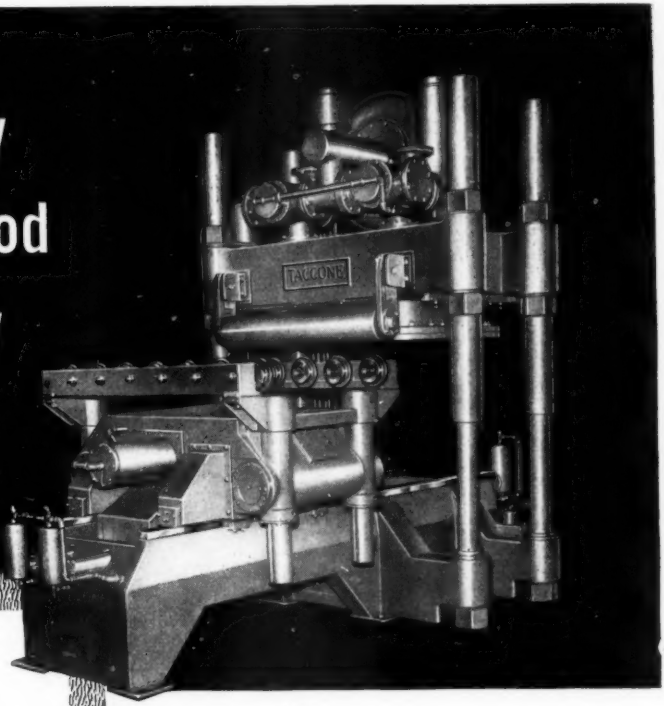
Product.	Month ended Nov. 30.	Eleven months ended November 30.	
	1958.	1957.	1958.
	Tons.	Tons.	Tons.
Pig-iron	14,248	120,108	134,991
Ferro-columbium (niobium)	3	81	34
Ferro-tungsten	185	535	804
Other ferro-alloys	305	2,940	3,296
Ingots, blooms, billets, slabs, sheets, and tinplate bars	3,614	997	16,503
Iron bars, rods, angles, shapes, and sections	145	1,717	1,626
Steel bars, rods, angles, sections, and shapes	34,263	466,149	306,521
Iron plates and sheets	—	413	1,705
Universal plates	714	6,237	4,311
Steel plates, ⅛ in. and under ¼ in.	1,239	10,359	8,119
Ditto, ¼ in. and over	13,839	171,943	160,140
Blacksheets and blackplate	31,013	321,657	264,965
Hoop and strip	9,269	79,593	71,891
Tinplate	56,682	375,253	364,362
Decorated tinplate	2,033	4,716	5,604
Galvanized sheets	11,633	170,211	77,450
Other (incl. tinned sheets, terneplate, and ternesheets)	1,595	17,662	12,555
Railway and tramway construction material	20,925	237,213	222,752
Wire rods of steel (incl. alloy steel)*	5,988	51,414	45,363
Wire	9,597	100,015	93,737
Tubes, pipes, and fittings	57,878	745,883	672,801
Iron castings	683	1,656	9,902
Steel castings	149	2,732	2,143
Forgings	534	7,658	6,719
TOTAL	276,534	2,897,142	2,488,294

* The figures for 1958 are not completely comparable with those for previous years.

Mr. H. H. DRAYCOTT, secretary and director, and senior executive members of the Renishaw Iron Works, Limited, welcomed 120 children of employees to the annual party in the works canteen on Saturday, January 3.

THE SHEFFIELD AND DISTRICT SCYTHEGRINDERS UNION, formed in 1926, now has only 13 members and is probably the smallest trade union in the world.

An entirely NEW method of Foundry Moulding



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'TACCONE' HIGH PRESSURE DIAPHRAGM MOULDING MACHINE

The 'Taccone' machine makes precision green sand pressure moulding available to every foundry. It ensures sound, accurate castings and the moulds it produces are superior to those made by conventional equipment. 'Taccone' moulds are consistently hard and uniform throughout and can be effortlessly produced by unskilled labour

All types of pattern equipment, including plaster wooden, plastic and metal patterns can be used, and there is practically no limitation on the size of flask employed. 'Taccone' machines are handling flasks 5ft. by 8ft. (larger sizes are envisaged) and already over 200 'Taccone' installations are in operation.

The dimensional accuracy and finish on the castings is comparable with work produced by shell moulding techniques.

The 'Taccone' is more than a machine, more than a process—it is a revolutionary system for rapid mould production.

Ten standard machines are available in the manufacturing range and special machines can be built to any size for any purpose.

Please write for information

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Foundry Machinery Division
BEDEWELL WORKS • HEBBURN-ON-TYNE • CO. DURHAM
Telephone: JARROW 897124

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

January 14, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.: N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 6d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7¼d. to 1s. 10¼d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £265 0s. 0d.; 90/98 per cent., £295 0s. 0d.

Ferro-columbium.—65/72 per cent., Nb + Ta, 19s. 9d. per lb, Nb + Ta.

Ferro-manganese (home).—78 per cent., £73 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., £32 15s. 0d.; tested, 0.08 to 0.33 per cent. C, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanised corrugated sheets, 24g., £67 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £231 5s. 0d. to £231 10s. 0d.; three months, £228 0s. 0d. to £228 5s. 0d.; settlement, £231 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 2d. per lb.; rods, 240s. 0d. per cwt. basis; 20 s.w.g., 245s. 0d. per cwt.

Tin.—Cash, £755 10s. 0d. to £756 0s. 0d.; three months, £756 10s. 0d. to £757 0s. 0d.; settlement, £756 0s. 0d.

Lead (Refined Pig).—First half January, £72 0s. 0d. to £72 2s. 6d.; first half April, £72 5s. 0d. to £72 10s. 0d.

Zinc.—First half January, £76 5s. 0d. to £76 7s. 6d.; first half April, £73 10s. 0d. to £73 12s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £111 10s. 0d.; rolled zinc (boiler plates), all English destinations, £109 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £95 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 9½d. per lb.; sheets to 10 w.g., 190s. 9d. per cwt.; wire, 2s. 7d.; rolled metal, 190s. 9d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £147; B6 (85/15), — ; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £182; HTB2 (38 tons), — ; HTB3 (48 tons), — .

Gunmetal.—BS1400, LG2 (85/5/5/5), £180; LG2 (86/7/5/2), £189; G1 (88/10/2/½), £249; (88/10/2/1), £243.

Phosphor Bronze.—BS1400, PB1 (AID released), £272 per ton.

Leaded Phosphor Bronze.—BS1400, LPB1 (1060), £206 per ton.

Phosphor Bronze Strip, etc.—Strip, 278s. 3d. per cwt.; wire, 3s. 11½d. per lb.; rods, 3s. 3d.; tubes, 3s. 3d.; chill cast bars: solids 3s. 2½d.; cored, 3s. 3½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 9½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 2½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 1½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £74 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £221; AB2, £235.

* Average 68-70 per cent.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

AUSTRALIA, February 27—Submersible motorized pumps and accessories. (ESB/31475/58.)

SOMERSET, January 24—Requirements of County Council include gully gratings and frames (11). Documents from the County Surveyor, County Hall, Taunton.

SHREWSBURY, February 2—Supply of materials required for Borough stores include manhole covers, gully grates and step irons (5). Documents from Borough Surveyor, Guildhall, Shrewsbury.

ST. MARYLEBONE, January 28—Sewer ironwork (11) required by Borough Council for twelve months commencing April 1. Documents from the Town Hall (Room 47), accompanied by stamped, addressed envelope, measuring approximately 11 by 5 in.

STOCKPORT, January 31—Supplies of iron castings ((a) (11)) required by Stockport Corporation for a period of 12 months commencing April 1. Documents from Borough Surveyor at the Town Hall.

DORSET, January 26—Requirements of County Council for a period of one year from April 1, include signs and castings (6). Documents from the County Surveyor, County Hall, Dorchester, Dorset.

ABERDARE, January 24—Supplies of manhole and inspection frames and covers; gully gratings and frames (13). Documents from the Engineer and Surveyor to the Council, Vestry Hall, Aberdare.

CANTERBURY, January 24—Materials required by City Engineer and Surveyor's Department during the year ending March 31, 1960, include castings (3). Documents from Mr. J. C. Rhodes, Municipal Buildings, Dane John, Canterbury.

BOURNEMOUTH, January 31—Supply of manhole covers and frames, etc. Documents from Borough Engineer, Bournemouth Town Hall.

LLANDEILO, February 20—Supplying, laying and jointing approximately 1¼ miles 6-in. dia. cast-iron water mains; 38 miles 4-in. dia. steel, cast iron and asbestos cement water mains; and 11¼ miles 3-in. dia. cast-iron and asbestos-cement water mains. Documents from Sandford Fawcett & Partners, 53, Victoria Street, London, S.W.1. Deposit £5 5s.

METROPOLITAN WATER BOARD, January 29—Supplies for stores include cast- and spun-iron straight pipes and cast-iron specials (3). Also required, small-iron castings, valve, hydrant and stopcock boxes, etc., and non-ferrous castings (19). Documents from Chief Engineer, Offices of the Board (Room 121), New River Head, Rosebery Avenue, London, E.C.1. (S.a.e. not smaller than 15 by 10 in., and stamps to the vale of 1s.)

OLDBURY, January 30—Requirements of Corporation during the year ending March 31, 1960, include iron castings (11). Documents from Borough Engineer and Surveyor, Municipal Bank Chambers, Oldbury, near Birmingham.

STAFFORDSHIRE, February 3—Materials required for year ending March, 1960, include castings and road ironwork (m) and traffic signs (k). Documents from Mr. F. Jepson, O.B.E., County Buildings, Stafford.

WORTHING, January 21—Requirements of Borough Council for the year ending March 31, 1960, include manhole covers, road gully gratings and frames (6). Documents from the Borough Engineer, Town Hall, Worthing.

USA—Machine tools. (ESB/31104/58.)

NEW ZEALAND, February 5—Electric hoist. (ESB/31836/58.)

USA—Foundry equipment and supplies. (ESB/31812/58.)

SUDAN, February 16—Hard foundry coke. (ESB/31875/58.)

Recent Wills

DAVIDSON, T. H. V., brassfounder, of Dundee ... £22,612

PLANCK, COL. O. B., a former director of Stewarts and Lloyds, Limited £10,916

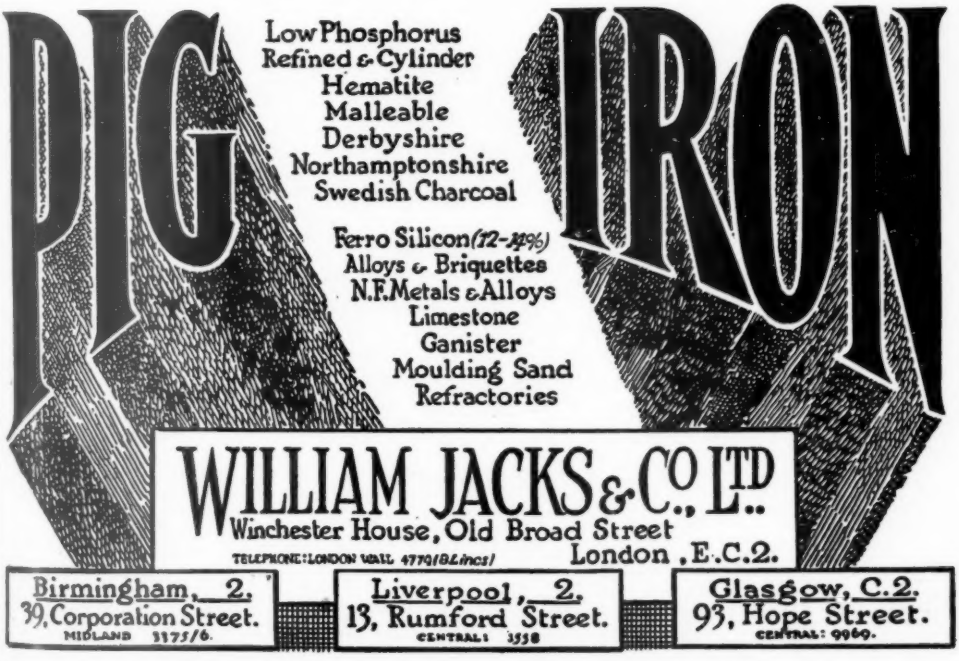
COOK, PERCY, works manager of Dartmouth Auto Castings, Limited, Smethwick (Staffs) £7,804

GUEILIKMAN, MICHAEL, a director of the Sturtevant Engineering Company, Limited, London, E.C.4 ... £19,757

BLAKE, W. H., founder and managing director of W. H. Blake & Company, Limited, structural engineers, of Sheffield £47,024

LINTOTT, H. J., former chairman and joint managing director of H. & E. Lintott, Limited, engineers and patternmakers, etc., of Horsham (Sussex) £12,683

MILLER, T. R., chairman and managing director of the Motherwell Bridge & Engineering Company, Limited, and a director of Bairds & Scottish Steel, Limited £178,836



CLASSIFIED ADVERTISEMENTS

PREPAID RATES: Fifteen words for 7/6 (minimum charge) and 4d. per word thereafter. Box Numbers 2/3 extra (including postage of replies). Situations wanted 2d. per word throughout.

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATION WANTED

GRAVITY DIECASTER (31) with 7 years' experience in aluminium alloys seeks employment, anywhere considered. Box GD426, FOUNDRY TRADE JOURNAL.

SENIOR FOUNDRY REPRESENTATIVE, age 34, ten years' experience administration and sales. Top level contacts, proven record, highest references. Desires managerial position. Box SF418, FOUNDRY TRADE JOURNAL.

MIDLANDS REPRESENTATIVE available short notice, thorough knowledge, connection foundry trade. All branches. Aged 49. M.I.B.F. Car. Phone. Salary/expenses basis. Full particulars, requirements, Box MR420, FOUNDRY TRADE JOURNAL.

TOOLROOM MANAGER, own car, 18 years' experience of gravity die manufacture and foundry trade, requires progressive position. Box TM425, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN (39) desires position with Principal interested in time-served man (North Country trained) having experience in Green, Dry, and CO_2 sands, with some Shell Moulding experience, Cupola and Sand Control. Permanency and progress main interests. Box FF409, FOUNDRY TRADE JOURNAL.

FOUNDRY TECHNOLOGIST (Indian, 34), A.M.I.B., M.I.I.F., M.I.E.T., N.F.C. Diploma U.K. 15 years' experience up-to-date knowledge in high duty, grey C.I. steel, S.G. malleable iron, non-ferrous. Especially trained in servicing, operation up to 60 ton Direct Arc, 2 ton H.F. Furnaces. Desires position with progressive European or Indian firm. Box FT412, FOUNDRY TRADE JOURNAL.

FOUNDRYMAN, Works/General Manager (45), seeks EXECUTIVE APPOINTMENT. Wide practical, high technical and administrative experience. Light, medium, heavy engineering, hydraulics, machine-tools, general castings, rain-water and soil goods, heating/cooking appliances, etc. Would welcome opportunity of relieving Owner/M.D., or sole control. Box FW411, FOUNDRY TRADE JOURNAL.

A FOUNDRY MANAGER, life experience, is interested in position with small West Midland Foundry, either grey iron, malleable (whiteheart) non-ferrous, thorough knowledge gained from good technical, practical experience. All aspects trade, covering jobbing to full repetition with sales, commercial, estimating, costing, age 49. M.I.B.F. excellent references, last change wanted to small, good type foundry requiring development and acceptance. Full responsibility envisaged. Salary/results basis preferred. Box AF419, FOUNDRY TRADE JOURNAL.

SITUATIONS WANTED—*contd.*

FOUNDRY EXECUTIVE offers services to far sighted Company who are backing their belief in the British Foundry Industry with a policy devoted to the latest management techniques and production methods.

The advertiser has passed through the stages of apprentice, Engineer graduate, Foundry post graduate, Technical commissioned rank H.M. Forces, and through the various executive levels quickly to senior appointments in both Iron and Non-ferrous Founding. Box FE408, FOUNDRY TRADE JOURNAL.

EX FOUNDRY MANAGER seeks situation in any organisation as CASTINGS BUYER or INSPECTOR. Life experience in Sand, Die, Shell and CO_2. All Metals. Can carry out complete liaison between Pattern supply and Supplier. Box EF404, FOUNDRY TRADE JOURNAL.

FOUNDRY ESTIMATOR (27), time served "Patternmaker," at present estimating in High Duty repetition Iron Foundry in pattern layouts, weight estimates from drawings, cost estimates, etc. Estimating or similar interesting post required. Box FE414, FOUNDRY TRADE JOURNAL.

PATTERN SHOP MANAGER/FOREMAN (34) desires situation of responsibility. Practical experience in all branches. Wood or Metal, Repetition, Shell, Jobbing, etc.; conversant with foundry machine shop and drawing office techniques. Box PS415, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

WANTED—REPRESENTATIVE calling on General Engineers in Glasgow Area to take up Agency for Malleable Iron Castings. Box WR413, FOUNDRY TRADE JOURNAL.

Metallurgist/Technologist

Required for London-area founders producing castings up to 5 tons weight, mainly in iron. Applications invited from really practical young men who can set up laboratory and, after a probationary period, take complete responsibility for melting plant, raw-material purchase, and metal and sand quality control in a plant producing 250 tons per month. Commencing salary of up to £1,000 p. a. is envisaged, with progressive increments. Own staff informed of vacancy.

Applications with full details in confidence to BOX MT 427
FOUNDRY TRADE JOURNAL

SITUATIONS VACANT—*contd.*

REQUIRED. First-class DESIGNER for Shotblast Machinery. Permanent position with excellent future and good salary. Box RF397, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required, West Riding, must have experience of high class aluminium and bronze castings; excellent prospects for first class technician seeking permanency. Box FM417, FOUNDRY TRADE JOURNAL.

REQUIRED—SKILLED PATTERN MAKER JOINER, small and medium wood patterns, to start up small Pattern Shop in manufacturing concern. Own foundries. Capable of controlling labour and run department. Outside London. House available. Box RS410, FOUNDRY TRADE JOURNAL.

ESTIMATOR required for foundries and machine shops of medium sized expanding company in the Birmingham area. Ability to quote from drawings a necessity. Experience in Metallurgy and Draughtsmanship an advantage. Box ER392, FOUNDRY TRADE JOURNAL.

SALES REPRESENTATION required on commission basis by Foundry Company in Sheffield area. Applicants must have experience in sale of engineering castings and should state age, experience and commission required. Box SR396, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER for progressive and old established Midland Foundry producing light alloy and copper base sand, gravity and pressure castings. Position offers scope and advancement for man with drive and ability to organise and control production. Detailed applications stating age, full experience, and salary required to Box FM400, FOUNDRY TRADE JOURNAL.

DESIGNER / DRAUGHTSMAN for pressure and gravity dies in aluminium, copper and zinc base alloys. Must be accurate and capable of working on own initiative. Applications stating full experience, age and salary required to Box DD401, FOUNDRY TRADE JOURNAL.

SALES REPRESENTATIVE for old established and progressive foundry, producing light alloy, copper base and zinc base castings, gravity, sand and pressure. Must be experienced with well established connections in general and electrical engineering. No others need apply. Full details of experience, age and salary to Box SR402, FOUNDRY TRADE JOURNAL.

PRODUCTION MANAGER required for modern shop producing extensive range of cooking and heating appliances. Applicants should be qualified engineers with actual experience in organising production and preferably with some knowledge of design. Commencing salary not less than £1,500 p.a. with free house. Excellent prospects of advancement for suitable man of good education and qualifications. Box PM423, FOUNDRY TRADE JOURNAL.